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THE

QUEENSLAND NATURALIST

JOURNAL OF THE QUEENSLAND NATURALISTS' CLUB
AND NATURE-LOVERS' LEAGUE

VOL. XI

JANUARY, 1939

No. 1

PROCEEDINGS.

EVENING MEETING, 18th July, 1938.—The President, Dr. D. A. Herbert, occupied the chair, and 36 members were present. Miss Dabbs was elected a member of the Club. Mr. J. E. Young and Mr. C. T. White spoke of the botany of Moggill Scrub, one of the few remnants of rain-forest standing near Brisbane. A report on the birds seen at Moggill Scrub was given by the Hon. Secretary, Miss E. E. Baird. The chief business of the evening was the demonstration of a balopticon by Mr. Dockrey, representing the Watson Victor Company. Photographs and articles of natural history were shown through the balopticon by Dr. W. H. Bryan, Dr. D. A. Herbert, Dr. E. O. Marks, Mr. C. T. White, Mr. S. T. Blake, Mr. J. E. Young and Mr. G. H. Barker. A selection of ordinary lantern slides was shown by Mr. W. J. Sanderson. A vote of thanks to Mr. Dockrey and the various exhibitors was carried unanimously. A grinding-stone found in an aboriginal kitchen-midden, Stradbroke Island, was shown by Mr. Ken Jackson. Mr. Jackson also tabled specimens of the rhizomes of the Bungwall Fern (*Blechnum serrulatum*), an article of diet of the early aboriginals of Moreton Bay.

EVENING MEETING, 15th August, 1938.—The President, Dr. D. A. Herbert, occupied the chair, and 37 members were present. Mrs. N. McClymont, Miss D. K. Powell, B.Sc., Mr. J. S. Robertson and Dr. C. P. Ledward were elected members of the Club. Reports on the botany of the excursion to Sunnybank were given by Mr. C. T. White and Mr. S. T. Blake. Dr. E. O. Marks called attention to a newspaper cutting regarding the killing of wallabies at Canaipa. He moved that the Under Secretary for Agriculture and Stock be written to and his attention drawn to the matter, as Stradbroke Island is a sanctuary for animals and birds. The main business of the evening was a lecture by the President, Dr. D. A. Herbert, on Ground Orchids. Exhibits were staged by:—(1) Mrs. Estelle Thomson, stereoscopic photographs of Victorian orchids taken by Mrs. Eaves, of Melbourne; (2) Pod of the Match-Box Bean (*Entada*

scandens), from North Queensland, by Mr. J. E. Young; (3) Photographs of Queensland orchids by Mrs. Herbert Curtis; (4) Photographs of *Pterostylis* by Mr. S. T. Blake; (5) Fishbones, pandanus drupes and shell ornaments found in a cave at Point Lookout by Mr. Ken Jackson.

Evening Meeting, 9th September, 1938.—The President, Dr. D. A. Herbert, occupied the chair, and about 60 members were present. The evening was devoted to an exhibition of wild-flowers and natural history objects. Wild-flowers from various places in South-East Queensland were tabled, and before going round the tables remarks in general on the specimens were made by the President, Dr. D. A. Herbert. Exhibits of shells, rocks and insects were shown by various members.

Evening Meeting, 17th October, 1938.—The President, Dr. D. A. Herbert, occupied the chair, and about 40 members were present. Mrs. Morton and Miss Sanderson were elected members of the Club. A report on the birds seen about Nudgee Lagoon on the Club's excursion on the 15th October was given by Mrs. Comrie-Smith. Twenty-five species were listed. It was reported that the Bora Ring at Nudgee Lagoon had been repaired. The fence was erected, but the ring itself still needed a little attention. October being bird month, lecturettes were given by Mr. J. E. Young, on the birds of the Carnarvon Ranges, and by Mr. W. Arundell, on rare birds still to be seen about Brisbane. Mr. Neville Cayley, the well-known ornithologist of Sydney, was welcomed to the meeting by the President, and spoke briefly about the work of the Gould League of Bird Lovers in New South Wales. He said that as this is the hundredth anniversary of Gould's visit to Australia, several commemoration meetings were to be held in Sydney. He said his principal object in coming to Queensland was to try to revive the Gould League in this State, and further, to form a Commonwealth body. With the aid of a bioscope, lent by Messrs. Harringtons Ltd., Mr. G. H. Barker screened some beautiful colour plates of American birds, particularly sea-birds. A collection of wild-flowers received from the South Australia Field Naturalists' Club was exhibited.

Evening Meeting, 21st November, 1938.—The President, Dr. D. A. Herbert, occupied the chair, and about 30 members were present. A report on the visit to the Sherwood Arboretum was given by the President. Exhibits were shown as follows:—(1) By the President,

natural grafts of roots in a wattle at Sunnybank, stem of a *Myrtus* with vine deeply imbedded in it, and a rust growing on *Gnaphalium*, new to Queensland. (2) By Mr. J. E. Young, clump of *Sarcochilus Ceciliae*, flowering and flourishing as a pot-plant; specimens of coal, oil-bearing shale, and granites from the Carnarvon Range, specimens of a rare elkhorn (*Platynerium Veitchii*), nest of one of the Mason wasps, and a very large ant lion, all from the Carnarvon Ranges. (3) By Dr. E. O. Marks, specimens of Fig Tree (*Ficus Watkissiana*), and a seedling from it, differing considerably from the parent plant. Both trees were growing at his residence at Wickham Terrace. (4) By Mrs. and Miss Williams, flowers of *Dendrobium undulatum*, *Cymbidium Sparkesii*, and *Cymbidium canaliculatum*, cultivated at Brisbane, also a white sport of *Ageratum conyzoides*. (5) By Mr. C. T. White, lantern slides of Eucalypts of the Brisbane district, from photographs by Mr. W. J. Sanderson. (6) By Mr. F. A. Perkins, lantern slides illustrating the life history of several different types of insects. (7) By Mr. S. T. Blake, lantern slides of scenery mostly in the West and North-West of Queensland, showing the typical vegetation of these areas.

DENDROBIUM SCHNEIDERAE Bail.

A New Northern Form.

By the Rev. H. M. R. Rupp.

Early in the spring of 1937, Dr. C. P. Ledward, of Burleigh Heads, paid a visit to Mackay. He explored part of the Eungella Range for orchids; and subsequently he sent me a small plant, apparently a *Dendrob* allied to *D. monophyllum*, which did not agree very well with any Queensland species hitherto described. Flowers were not seen. The habit and form were not unlike those of *D. Schneiderae*; but the living pseudobulbs were twice as large, and less wrinkled; the dimensions of the leaves were also twice those of the little southern species. Both Dr. Ledward's and my own plants are now (late February, 1938) flowering. Racemes appeared before Christmas, and as they developed they soon greatly exceeded those of *D. Schneiderae* in length. One is now 17 cm. long, with 24 buds and flowers. Notwithstanding these disparities, as the first buds matured it became obvious that affinity with *D. Schneiderae* was very close indeed; and we are now satisfied that the Eungella plant must be

included in this species. The individual flowers, which are wholly pale green except for the dark internal markings, are no larger than in the type, and the labellum and column are completely identical. (For Bailey's description of *D. Schneiderae*, see "Queensland Flora," vol. v., p. 1531.) Bailey gives the Darlington Range as the habitat; the species has since been collected in several other localities on both sides of the Queensland—New South Wales border. It grows high up on branches of the Hoop Pine and other large forest trees, but has also been seen on rocks. The Mackay discovery is more than 500 miles north of these localities; and the form of the plant is so distinctive that we think it should be known as *D. Schneiderae* var. *major*.

Pseudobulbi 2—2½ cm. longi, 1—1½ cm. lati. Folia 4 cm. x 5 mm. Racemi 14—17 cm. longi, cum floribus 15—24. Flores pallidi parvique.

THE ROMANCE OF THE BUNYA TREE.

By H. E. Yonng, M.Sc.Agr.

With the establishment of a settlement at Moreton Bay, the existence of a tree, which was known as the "Bunnia Bunnia" to the aboriginal inhabitants of the neighbouring country, became definitely accepted, although its exact nature was not established until some years later. The fame of the periodic "bnnnia" feasts spread to the white settlers, and their curiosity as to the exact nature of the tree was whetted.

The first record of a white man having seen the trees is on November 29th, 1823. On this day John Oxley, the Surveyor-General, in the ship "Mermaid" anchored at the southern entrance to Pumie Stone River, which is now called Pumie Stone Passage, and which separates Bribie Island from the mainland. His anchorage was at the southern entrance to the passage in Moreton Bay. Here he encountered the convict castaways, Pamphlet and Finnegan, who, in company with two others named Parsons and Thompson, had set out from Sydney by boat to go to Illawarra for cedar. A gale arose whilst they were on their way, and they lost their bearings, and eventually were wrecked on Moreton Island several hundred miles north of where they thought they were. Thompson died of thirst during the voyage. The three survivors, with the exception of Parsons, "who was absent at a "bunnia feast," were able to show Oxley the Brisbane River, and

Finnegan guided him up it for some distance. Parsons was not found until January in the next year, when he had made his way to Moreton Bay intending to rejoin his fellow castaways. He had, having disagreed with and left his companions at Bribie Island, spent two years with the blacks wandering in the country just to the north of Moreton Bay. He was well treated by his adopted tribe, and had with them passed through country in which the Bunya tree was plentiful, and as mentioned above, had actually attended a bunya feast. It is noteworthy that in the next year (1824) the "hoop" pine (*Araucaria Cunninghamii*), which was in the early days known as the "Moreton Bay" pine, was officially collected and reported on by the King's botanist, Allan Cunningham, in honour of whom it was subsequently named.

The next white man to see the bunya tree (the spelling of the name has altered from "bunnia" to the modern form "bunya"), as far as records go, was James Bracefell, or Bracefield, who also was a convict. He had escaped from a chain gang at Moreton Bay Settlement shortly after the commencement of Commandant Logan's severe regime in 1825, and had been adopted by a tribe of blacks whose domicile was the Maroochy (black swan) River district. The chief of the tribe was called Eumundy, and he, fortunately for the runaway, had thought Bracefell was a reincarnation of a departed relative, and had personally adopted the young man as his son instead of killing him as was the usual custom. Bracefell, on account of his loquacity, was given the name of "Wandi," which means "a great talker." This man lived the life of an aboriginal until 1842, a period of sixteen years, during which time he attended the Bunya feasts in the Bunya seasons. In later years, after his release from his primitive life, he was employed at Goodna, near Brisbane, by a Doctor Simpson, in whose service he was killed by a falling tree.

The next name connected with the Bunya is that of James Davis, another runaway convict, who had been transported from Scotland in 1824 at sixteen years of age. He was sent to Moreton Bay, and in 1826 escaped from his gaolers who, as in the case of Bracefell, were of Logan's 57th regiment, and like him, was adopted by the blacks, and lived with the Mary River tribe. He died in Brisbane in 1889, aged eighty-one years, and was buried at Toowong Cemetery. He left, for him, the amazing sum of £10,000. Davis, on account of his remarkable agility, was known to the natives as "Derhamboi" or

"Durhamboi," which is their name for the kangaroo rat. He was an expert tree climber and attended the Bunya feasts with his tribe.

In 1838, Andrew Petrie, who held the position of foreman of works at the settlement on Moreton Bay, was guided by friendly natives to a place where Bunya trees grew, which probably was on the Blackall Range, which was then known as the "Bunnia Bunnia" Range. He procured a sample of the timber with which he was much impressed, and made a sketch of the tree. After this it became known in the settlement as Petrie's Pine or *pinus petriana*, on account of his enthusiasm for the tree, although it had not been brought to the notice of the botanical authorities. In May, 1842, the year of the opening of Brisbane to free settlers, Mr. H. S. Russell, with a Mr. Joliffe and a Mr. Drottesloy, set out from Brisbane to examine the country further up the coast. They were on the lookout for suitable country in which to form grazing properties. They were particularly interested in the Wide Bay district, and had been commissioned to report on the coast as far north as Port Curtis. Mr. Petrie, in his character of foreman of works, was at the same time being sent by the Governor to find the place where the Bunya pine was said to grow, and was then to make a full report on it. This place was on the banks of a river a little north of the river called "Morouehidor." It was arranged then that the two parties should combine and go together. The boat was a crude whaleboat, built by a convict and rowed by five convicts, and was provided with a small sail. Unfortunately, some time after leaving Brisbane, it was discovered that Petrie had forgotten to put the sextant on board, and the party was unable to make a number of the observations it had intended.

On reaching the Maroochy River they were unable to cross the bar owing presumably to the surf and the shallow water, but later landed a few miles to the north in a small bay near Noosa Head, so that they were unable to proceed up the river in search of the Bunya Pine. The blacks at their landing place informed the party that a white man (Bracefell) was living with a tribe about two days' journey away, and Petrie sent him a note by one of these natives. Three days later Bracefell arrived and was persuaded to accompany the expedition. But he only agreed to this after being assured that Logan was no longer in charge of the settlement at Brisbane, which to the blacks was known as "Meginchen." The party then proceeded north to Fraser's Island and Wide Bay, and pushed up



Bunya Pine (*Araucaria Bidwillii*) in rain-forest, Bunya Mountains.
—Photo by H. E. Young.



the Mary River, looking for suitable grazing country. On the river bank was found another species of pine (probably a species of *Callitris* or Cypress pine), of which Petrie took a sample. It was in this district that the blacks informed Bracefell of the presence of another white man in the neighbourhood, and Bracefell found him in a large blacks camp at Mt. Boppol; after much persuasion and many promises he also was induced to join the party, and he turned out to be Davis ("Derhamboi"). The gathering with which Davis was at the time of his discovery was a large one, the members of which were on the way to avenge the wholesale poisoning of a number of blacks by white settlers. The party returned after this without having seen the famous Bunya tree, although suitable grazing country was found.

At about this time a proclamation was issued prohibiting any white man from cutting down a Bunya tree or encroaching on Bunya territory for settlement purposes. Now that the greater part of the Bunya forests have been harvested for timber it would be of interest to know whether this proclamation was ever specifically rescinded.

Shortly after the return of this expedition in 1842, Russell, still in search of sheep country, came across a gentleman by the name of Bidwell at Kilcoy Station, high up on the Brisbane River. Bidwell was a botanist attached to the Botanical Society of London. On one of his collecting excursions he had got as far as Kilcoy, intent on finding Bunya trees, and, if possible, obtaining young living specimens. He accompanied Russell northwards, and within a few miles Russell was able to show him a fine specimen of the tree in question, with ten seedlings growing beneath it. Of these seedlings Bidwell dug out three, which he packed in a wardian case and forwarded to London by the first ship. He also made a collection of specimens from the trees and sketches of the species. While in London in 1856, Russell states that he saw one of the seedlings growing vigorously at Kew Gardens in London, and another at Chatsworth. He could not trace the third specimen. It would be interesting to learn the ultimate fate of the two trees, which were then living and if they still survive.

The tree was thus reported officially, and was assigned to the genus *Araucaria*, not *Pinus*, to which, although a conifer, it is not closely related, and given the specific name of *Bidwellii* by Hooker, after the collector Bidwell. This specific name has, in the course of time, and no doubt

due to error, been corrupted to *Bidwillii*. The Bunya tree is therefore strictly not a pine, nor for that matter is the hoop pine. Records of the tree's presence were also made by Dr. Ludwig Leichhardt, on the Condamine, Dawson, and Burnett Rivers, and between Cleveland and Rockingham Bays during the period 1844-48. It is interesting to note that cones of the tree were about this time sold in London at Covent Garden for ten guineas each.

The genus *Araucaria*, to which the Bunya belongs, contains twelve species which are distributed around the shores of the South Pacific Ocean. The generic name itself is derived from a tribe of South American Indians known as the Araucanos. It was in South America that the genus was first discovered, the species native there being *Araucaria brasiliensis* in Brazil, and *A. imbricata* in Chile, the latter being known as the monkey puzzle tree on account of the intricate nature of its branching. The seeds of this species, like the Bunya, are edible.

On Norfolk Island occurs *Araucaria excelsa*, the Norfolk Island pine, so popular for avenue plantings in the coastal resorts of Australia. Many of the earlier houses in Sydney were built of the timber of this tree, which was conveyed thither from the penal settlement on the island. It is recorded that before settlement was made at Norfolk Island, that the ground was so thickly populated with pine trees that there was no room to build a hut. The advance of settlement has, of course, greatly modified this state of affairs.

In Australia the Araucarias are represented by *Araucaria bidwillii* (the Bunya pine), *A. Cunninghamii* (the hoop pine), and *A. cunninghamii* var. *glauca*, the last-named tree inhabit the coastal islands and the fringing mainland of North Queensland, and is noted for the bluish appearance of its foliage and the twisted nature of its trunk. Even in good situations it is not of such good form as the hoop pine proper, as its malformed nature appears to be to a large extent inherent and not solely a character due to its exposed habitat. In New Guinea the hoop pine (*A. Cunninghamii*) is present with another species, *A. klinkio*. Both of these grow on the highlands in that country. *Araucaria Cookii* grows in New Caledonia.

It is considered that the genus to which these trees belong, in common with a number of others, had its origin in the Antarctic continent, when it was warmer there, and was distributed from there up around the borders of the Pacific to its present habitats.

In Australia the Bunya pine is not nearly so widely distributed as is the hoop pine, which extends from the Northern Rivers district of New South Wales right up through coastal Queensland to New Guinea. The bunya is limited to the rain-forests of south-eastern Queensland, from the Bunya Mountains and Blackbutt Range in the south, to the Burnett river in the north. Its western limit is the Bunya Mountains, and its eastern boundary the Blackall Range. The timber of the Bunya is of equal market value to hoop pine from which, in the milled state, it is indistinguishable both in appearance and properties. The Bunya and hoop pines supply a coniferous soft wood which, for internal work and for strength, cannot be well matched elsewhere in the world.

The botanical features of the Bunya may be obtained in any standard work on the botany of Queensland, but a short account of the uses made of the fruits by the aboriginal inhabitants is of interest.

The main crop of seed on the Bunya occurs every third year, the cones taking three years to develop to maturity on the parent tree. Odd cones are found on many trees in the years between the main crops, but these are few in comparison with the triennial crop. The cones to the timber-getters are known as pods, and are borne on the topmost branches of the trees, and may number a score or more on a large tree. They are nine and twelve inches long by six to eight inches in diameter. The seeds are large and weigh on the average thirty to the pound. They have a thin cartilaginous shell, and contain an abundance of starch. There is some variation in the appearance of the seeds from some trees. The usual form is conical, with a creamy white shell; another common form is almost round, with a pointed end, and of a brownish colour. The latter type are smaller than the more common elongate form.

The Bunya nut formed an irresistible attraction to the aboriginals in the fruiting season, which occurs between December and March.

It would appear that the Bunya trees in any particular tribal district would belong to the tribe in that locality. Some people say that the trees were handed down from father to son as heirlooms, and that only the man who owned the trees had the right to climb them. On the other hand, Mrs. Campbell-Praed in "Australian Life, Black and White," states that "the fiercest fights arise between the assembled tribes in the preliminary apportionment to each before the season begins," but that

"once that matter was agreed upon no poaching ever occurred." Some people even state that the tomahawk scars were cut in such a fashion that each tree was really branded with its owner's mark. An examination of scars in different localities, however, does not seem to bear this out.

In any case, when the Bunya season approached, message sticks were sent out from the tribes living in Bunya districts, inviting distant tribes to the forthcoming Bunya feast. The invited tribes often invited others, and all gradually converged on the appointed localities. It is even recorded that a tribe came from as far west as the Barcoo River and the Bunya Mountains just north of Dalby. Large numbers of natives thus became assembled, and the apportionment of the trees began. The method of distribution probably varied in different districts because the reports on this matter are often conflicting.

The trees were ascended by means of toe holds cut in the bark of the trees by means of stone axes. These notches were cut up as far as the lowest limb, which might be sixty to eighty feet above the ground. The scars were cut in two rows, those in each row being vertically above each other. The right hand row formed a right foot-hold and the left was for the left foot.

The distance apart of the scars was as far as the climber could stretch with his legs, which in some cases was just over four feet. On most trees two, and often, three, notches were cut one above the other, two or three inches apart, as a choice of foot-holds for each step. This was probably done so that men with shorter legs might climb as well as those who could stretch the maximum distance.

The foot-holds were made by first procuring a length of a pliable vine sufficient to pass around both the tree and the man's body, and then cutting the first notch with a stone axe at a height of two feet six inches to three feet above the ground. The vine in many cases would be quite long, as many mature trees are seven feet in diameter, and possibly was not used at all in many cases. The left foot was then placed in the lowest notch, the vine was flicked up higher, and then, leaning back, the climber drew himself up to a standing position. Another notch was then made for his right leg at a distance up the tree, which was the maximum he could stretch. A third cut was made above his head and over his right shoulder by chopping above and across his head; this was the second hold for the left foot. The vine was then flicked up, and he mount-



Bunya Tree (*Araucaria Bidwillii*), showing ancient axe-cuts,
Bunya Mountains.

—Photo by Mrs. H. E. Young.

ed into the right foot-hold, then the left one, from which position he repeated his performance of making two further cuts, and by this means gradually progressed up the tree. The cutting of the foot-holds required quite a large amount of work and perseverance owing to the crudeness of his tool, namely, his stone axe. These axes were of necessity very blunt, and their action was rather one of bruising than of cutting, and the Bunya bark is tough and hard.

When the trees were smaller, such as those with a girth of 5 feet and less, a shorter length of vine, if this was to be used, would be procured. One end was tied around the native's left wrist, whilst a knot was tied at the other end which, after being passed around the tree, was held in his right hand. In another method a loop was tied at each end of the vine, and being passed about the tree trunk, one hand was passed through each loop. In neither of these latter cases would the vine be passed about the climber's body.

The cuts made were often a foot in length horizontally, and in depth about two inches. In no case which has been examined do the scars extend into the wood of the tree. Perhaps the thickness of the bark, usually above three inches in a well-grown tree, and in extreme cases up to fourteen inches, account for this, or else the natives may have found, by centuries of experience, that the Bunya when deeply scarred, is liable to rot and subsequent decay; this latter theory is, however, improbable.

Often several sets of mounting notches are present on the one large tree. The reason for this is unknown. The bark is hard, and the scars would have been difficult to make, so that there was probably some special significance attached to this practice. The natives were very superstitious, and perhaps some of the climbing avenues became in time to be deemed unlucky, and a new lot had to be cut.

Once the scars were cut there would be no further need for the vine in climbing owing to the hand and foot-holds provided. In the rain-forest where the majority of the trees are situated, growth is normally extremely slow. This is due to the competition for moisture, light and nutrients among the numerous trees present, hence the occlusion of the scars is very slow. Even now, at least sixty years since the Bunya feast last took place, the scars are plainly visible except where rapid growth is taking place, such as on the edge of the forest or inside it where competition has been relieved by the removal of one or more of the dominant trees. From this it will be seen

that the notches would only have to be opened up once in every few successive Bunya feasts, except where a tree had grown fast as described above. In a number of cases noted relatively large trees have been seen growing close against the trunk of a Bunya pine and hiding the scars. Such a tree is often eighteen inches or more in diameter, and has obviously grown since the last Bunya feast in that area.

In the monsoon type of rain-forest, which is characterised by its relative openness, almost all the large trees bear aboriginal climbing notches, except where the formation is a very large one, when those in the interior of the development are not marked. In the wet coastal rain-forests the trees in the interior of the formations are seldom marked, whilst those within a short distance of its edge are invariably scarred. The Australian aboriginal was notably very fearful of entering a thick rain-forest, on account of the evil spirits which he knew lived there, and he only ventured so far as he knew that he could get out again before nightfall. This explains the absence of marked trees in the depths of the coastal rain-forests. In the more open monsoon forest type as exemplified in the Yarraman-Nanango district of the Brisbane Valley, the main reason for the absence of aboriginal markings on the abundant Bunya pines is possibly the fact that surface water is not very plentiful there. Thus suitable camping grounds would not be provided in many places. Of course, it is possible that their superstitions may also have played a major part here as in the true rain-forest types such as in the Mary Valley.

In the Bunya Mountains, which are situated some few miles north of Dalby, in South Queensland, the aboriginals would never camp the night on the mountains, but would always return to the open forest on the lower ground before dark. Marks on the rocks in some of the peculiar upland savannahs, which are dotted through the rain-forests of these mountains are evidently those made by natives in grinding the edges of their stone implements whilst at the Bunya feasts. It is suggested that the presence of these grassy areas is possibly due to the continued and regular firing of the areas by the natives. There is now ample evidence that the patches are being colonised by rain-forest species except where burning-off is still carried out annually for grazing purposes.

To return to the Bunya feast, however, the tribes, in converging to their appointed Bunya areas, would gradually unite in larger and larger numbers until at length all

were gathered together in the Bunya districts. When the final camping ground was reached, a man, the owner of the particular tree (where individual ownership existed), would climb a tree, detach a cone and examine it, and pronounce that everything was all right, and the feast would then begin. The trees would then be climbed when nuts were required and the cones knocked off. The nuts were eaten both raw and roasted in the camp fires. Sometimes they were ground to a flour and used in that form.

During a Bunya season, it is not to be understood that the Bunya nut provided all the food; on the contrary, wallabies, scrub turkeys, snakes, yams, fern rhizomes, and other naturally occurring foods, were eagerly sought after to supplement the high carbohydrate diet, and towards the end of the nut season, the animals, birds and other game began to get rather scarce, owing to the presence of the large population of aborigines, and gradually the tribes would move off to other hunting grounds, the inland natives often going to the coastal territory of some friendly tribe for a while before returning to their own usual haunts. In this way, changes in diet were provided for the different peoples.

At the Bunya feasts there were many social functions and new corroborees were acted for the benefit of other tribes, and were thus passed about the country later on. Kippa ceremonies were carried out often by several tribes combined, when the young men or "kippas" were painfully initiated into the status of manhood. Family feuds were sometimes brought to a head, resulting in a fight between the parties concerned; anybody killed was often eaten either wholly or in part by his relatives and friends, who thus hoped to become infused with the good qualities of the dead man. Finally, however, the Bunya nut supply being exhausted and the other foods becoming scarce, each tribe gradually made its way homewards, to return in three years' time.

The nuts themselves, when in plenty, were often preserved for a time by burying them in the wet mud of a waterhole, where they were often left for some weeks before being dug up and consumed. Many would then be mouldy and some sprouting, but were still considered edible by the natives. It is worth noting that there is an idea prevalent amongst the white population that the embryo of the seed is poisonous. This is erroneous, the embryo being quite sweet and innocuous. The cones were not allowed to fall and be collected on the ground, because only a small percentage would thus be recovered owing

to the depredations of rats, bandieoots, wallabies and opossums, which eat every nut they can find, and it would mean a total loss if the nuts were exposed to these predators for long. In fact, between the natives and the wild animals it is a great wonder that the Bunya pine managed to exist in the numbers present before milling the timber on a large scale commenced. This may explain the comparatively limited distribution of the species as compared with the hoop pine.

In conclusion, it may be stated that the Bunya pine has played a large and important part in the social and economic life of the aboriginal inhabitants of south-eastern Queensland, and a lesser extent, perhaps, in the whole of Australia, because at the triennial meetings tribal corroborees from far districts would be enacted and then carried away and replayed at other places, and thus passed gradually far and wide. Owing to the overgrowth of bark and to the sawmilling industry, together with the natural death of the old marked trees, most visible traces of the association of the natives and the trees will, in the course of time be lost. Even in the Bunya Mountains National Park, where the best remaining collection of marked trees is to be seen, these relics of the past will within a comparatively few years disappear, due to natural agencies. In order to provide material for future study, it is suggested that one or more Bunya logs be preserved with the bark on, in some suitable place such as a museum, for in future years such specimens would be an invaluable asset to any ethnological and historical collection.

DESCRIPTIONS OF SOME CHALCID WASPS.

By A. A. Girault, B.Sc.

The following species have been reared mostly from various pest insects; and on this account ought to have speedy publication. Also they form contributions to a monograph now completed (MSS.). The types are in some Australian museum. The descriptions follow.
Gyrolasella margiscutellum nov.

In my revision of the species runs to *trifasciatifrons*, but the face is not trifasciate, the wings are always hyaline, there are no distinct transverse lemon abdominal marginal marks, and the species is smaller and marked as follows: Green, flavous as follows—Head, except a large central mark upon the cheek, a spot upon the face against the eye above the antennae, a broken line through the antennae

(ba(se), ocellar spots, upper half of the occiput (at meson above incised with yellow and with a thin green line across, the scape above at distal half and below at base; the pedicel above, the distal margin of the scutellum, the lateral margins of the axillae, the lateral margins of the abdomen above and below brokenly; the hind coxae, the hind femora at not quite basal half above, often only at the lower half, always less beneath; the fore femora at a narrow line at centre of the lower side; and the middle femora above the basal half. Mandibles 4- and 5-dentate. Postmarginal, vein nearly as long as the stigmal, the venation yellow, the stigmal knob dusky. * First segment of the funicle square.

The male, though smaller, is about the same, but the cheeks are all pale, the antennae lighter, and the abdomen pale laterally only at wide centre narrowly and straightly. Other characteristics (structures) are in MS. From many pairs from the ova of *Gonipterus*, Canberra, F.C.T., A. L. Tonnoir.

Gyrolasella iphigenia nov.

In my revision of the species runs to *hemansi*, but differs thus: Only the meson of the pronotum is green; there is no band across the base of the clypeus; the mesal half or more of the parapside is green; the green of the scutellum is full at base and always a bit narrower at apex (that of the pronotum might be all in the variety, that of the scutum might suddenly narrow distad to a median line or else fill the whole scutum, and so with the postscutellum); hind coxae nearly all green (usually at least above); there is a blotch on each femur at ventral half, at basal half more or less (ventral and central in the fore and middle femora): this blotch is invariably present. The lines of the abdomen, though similar, yet differ thus—the first three (or even five) are joined very widely along the meson by suffused metallic, and the first two lines are represented only by marginal dots; No. 3 is thin and somewhat before the middle; No. 4 thicker and beyond middle; No. 5 is thick (its width from No. 4); the curved thin No. 6 is very near to the apex. The whole disk of the abdomen ventrad is black (the marginal bands showing laterad).

The male is smaller, the head and antennae yellow, and with the two proximal dots, the legs unmarked. the disc of the abdomen above metallic, the margins wavy. Ocellar area green. In both sexes, the cephalic mesopleurum and various marks upon the meso-venter are golden. Many specimens of both sexes reared with

margiscutellum above.

The jaws bear two large outer and two small inner teeth.

Of this species, I now describe the following variety:
Gyrolasella iphigenia hyacinthus nov.

A pair with the typical form. Like the typical form but: Scutum and the postsentellum and the pronotum all metallic; all (7 complete) bands of the abdomen (including No. 1 at base) are widely joined along the meson. Runs to *channingi* but: Half smaller; the postscutellum is all green; bands Nos. 6-7 of the abdomen are not paired and are very close together; the first funicle segment is longer than wide; there are only 7 lines upon the abdomen; the scutum and pronotum are all green (except in the latter, a lesser lateral corner). There is a band across the lower face and cheek, on the latter widening and turning ventrad. From *rarifasciatus*: Post scutellum solidly green; abdomen with only 7 cross-bands (8 in the other), and the median stripe does not narrow between any of Nos. 1-7; scutum all solid aeneus; the green spot of the axilla much smaller; and so forth.

Coccophagus clariscutellum Girault *fasciafacies* nov.

Differs from the typical form in bearing a wide cross-band upon the face *above* the antennae, the scutum entirely yellow. Described from a single female reared from *Aspidiotus perniciosus* on plum, Stanthorpe, J. H. Smith, Feb., 1927.

Dinoura apiomorphae nov.

As *auriventris* but the middle and hind tibiae are aeneus except rather widely at each end, and the middle ones beneath, the abdomen wholly metallic, and so the femora. Scutellum with a curved lateral groove. Fore femur with a fringe of long white hairs ventro-caudad. Propodeon with a median carina and a spiracular sulcus. Lateral ocellus about midway. Costal cell wide, a line of strong, black cilia cephalad, this doubled distad. Scape sub-equal to the first funicle joint; antennae thick, the first funicle much exceeding the pedicel, twice longer than wide, No. 6 slightly longer than wide, thirteen segments, two very short rings, three club segments. A female from *Apiomorpha* galls, Brisbane, H. Hacker.

Isoplatoides westraliana nov.

Two ring-joints. Purple, the legs except the coxae and the antennae except the last five segments, red yellow, also the basal half of the abdomen except immediate base (segments 2-3, basal half of 4, No. 2 equal to Nos. 3 plus

4). Fore wings with the following fuscous marks: the principal from near the apex of the stigmal vein a bit over half-way across and hook-shaped or like an L with the lower arm thicker than the upright and about as long and reversed, hence more J-shaped, the lower arm straight; two fainter spots in an oblique line centrally, the apical opposite the middle of the marginal vein, basal opposite the base of the same vein. Segments 1-2 of the funicle two and a half times longer than wide, Nos. 3-4 twice longer than wide, exceeding the pedicel, No. 6 a half longer than wide, slightly exceeding the pedicel. The two small spots on the wing are obscurely joined to each other; the caudal and proximal one is in the apex of the central triangle formed by the proximal ending of the discal ciliation, which comes to a point opposite the bend of the sub-marginal vein; the cephalic one is up along the cephalic margin of this triangle about half-way to base or where the side joins 4-5 lines depth of ciliation (along whole of the marginal vein); there is also a patch of ciliation 6-7 lines deep and half-way across from the sub-marginal vein commencing just proximad of the bend; and a cephalic line in the costal cell. Ciliation (fore wing) obliques from base (or near it) of the stigmal vein.

Stigmal vein long and slender, three-fourths the length of the marginal or postmarginal. Clypeus somewhat bilobed. Hind wings obtuse at apex, with 14-16 lines of discal ciliation. Bristles from the marginal and post-marginal veins very short, but there are stout ones of moderate length from the sub-marginal except distad where there are only 5-6 minute setae. At least one mandible 4-dentate. Palpi dark. Propodeon tricarinate, with a spiracular sulcus, the spiracle round. Thorax and head densely punctate, the scutum pilose. Parapsidal furrows complete, not conspicuous. Third segment of the maxillary palpus much shortest, somewhat longer than wide, about half the length of the second, the fourth longest, sub-elongate, almost as long as the three segments of the labial palpus whose middle segment is much the shortest. Both mandibles are 4-dentate. From four males reared from the Jarrah leaf-miner at Perth, West Australia, January 15, 1923, L. J. Newman. Types in the West Australian Museum.

Amonodontomerus poeta nov.

Much resembles *Euryperilampus*, which see. Form of *Macrodonterus*, but otherwise much as in *Toxeumoides*. Antennae at the clypeus, clavate, 11-jointed, 1 ring and 3

club joints. Mandibles tridentate. Clypeus convexly produced, entire. Marginal vein moderately long, about twice the length of the stigmal, the postmarginal exceeding the marginal, elongate. Ciliation normal. Pronotum cross-quadrate, shorter than the scutum, the latter's furrows deep. A distinct cross-suture before the apex of the scutellum. Petiole distinct, transverse. Propodeon with distinct, converging spiracular sulci, whose lateral edges are carinated. Spiracle small, round. Segments Nos. 2, 4 of the abdomen equal, each a third the length of the surface. No. 3 shorter but next longest; ovipositor nearly as long as the abdomen. Lateral ocelli closer to the eye than to the cephalic. Two hind tibial spurs.

Blue-green, the wings clear, the legs except the coxae and the hind femur, the antennae and the tegulae, brown-yellow. Finely cross-reticulated, the scutellum beyond the suture and the propodeon laterad of the sulci, glabrous as is also the abdomen. Pedicel not especially long, exceeding all the funicle segments which increase distad and are wider than long, the first nearly twice so, No. 5 over thrice so. A few longish setae from the vertex. Several cross-rows of fine setae are upon the pronotum, the scutum with more scattered and longer ones, the scutellum with four equal to those of the scutum. The discal ciliation extends to the base of the wing. The male is similar in colour. A male, two females reared from leaf-galls on *Eucalyptus* at Toowong on December 10th, 1920, by Mr. Hubert Jarvis.

Coccophagus horatii nov.

Belongs to that group of species where the abdomen is entirely black, the first segment of the funicle is not abruptly shortest, none of the funicle segments are elongate and the wings bear a distinct fuscous band. Runs to *vegai* and allies and closest to *ashmeadi* and its varieties, but differs from the latter in that the scutum is all yellow, the axilla black, as also nearly all the pronotum and the meso-metapleurum; the first segment of the funicle is narrower than the others and equal to the first club joint. Legs pale. Two females reared from *Eriococcus* on *Eucalyptus*, Indooroopilly, Jan., 1932.

Coccophagoides aurithorax nov.

Of the six species this one is characterised by having segment No. 2 of the funicle one-half shorter than the moderately long pedicel and square, the first segment distinctly wider than long and about half the length of the second. Head and thorax except mesopleurum and axillae and the base of the abdomen very narrowly, golden. Hind

coxae and femora black. Metatarsus equal to the middle tibial spur and to the first segment of the middle tarsus. Two females, Perth, W. Australia, from coccids, L. J. Newman.

Physeus atrithorax nov.

Belongs to those species with a black head and is the same as *addisoni*, except that the forelegs and the club are black. The abdomen is also margined with black for basal three-fourths. A single example reared from *Cero-plastes rubens* on Eugenia at Brisbane in June.

Anagyropsis smaragdus nov.

Belongs to that section of the genus where the ovipositor is not or barely extruded, rather is shortly extruded ($\frac{1}{4}$ or less of the abdomen) and the scape is only moderately, convexly dilated (clavate) and runs to *hardyi*, but the first funicle segment is only a half longer than wide and shorter than the pedicel. Queanbeyan, N.S. Wales, in November, from the eggs of *Gonipterus*, A. L. Tonnoir.

Anagyropsis spondyliaspidis nov.

In my modernised synopsis, runs to *dius* and *dyceri*, differing from the former in that the segments of the funicle are slightly longer than wide, slightly shorter than the pedicel, the antennae black except apices of scape and pedicel, hairless line with 5-6 lines of coarser cilia, closed by two lines caudad; bristles of the sub-marginal vein moderately gross; spiracle of the abdomen somewhat proximad of the middle. Ovipositor shortly extruded. The males bear antennal segments Nos. 1-2 and 6 much shortest, Nos. 1-2 large, unequal "ring-joints," club solid (joints of the funicle otherwise). The male scape is only thick; segments Nos. 1-2 of the funicle are each smaller than the globular pedicel, while Nos. 3-5, most of the scape and the club apically are silvery; else the male is like the other sex. Pairs reared at Black Mountain, F.C.T., from *Spondyliaspis eucalypti*, Dobson, by Mr. J. W. Evans, in December, 1929. The host is a Psyllid, and accounts for the frequent finding of members of this genus upon the leaves of *Eucalyptus* in close proximity to the cases of this kind of insect.

The following species have been received for identification from various sources and need publication. A note upon a Javanese insect, *Cupelmus grayi* Girault *brevicinctus* nov., is also added.

This variety is like the original description and diagnosis (later) of the typical form, but the white part of the ovipositor valves is short, not half the distal black and distinctly shorter than the basal; the middle femora.

are solidly aeneous, the middle tibia with a cinetus near the knee, this at about basal fourth. The following notes were also added:

The palpi are black, the segments short, but No. 4 is equal to the others united, long. Middle tibia with three black teeth below at apex, these similar to the teeth upon the ventral tarsus of the same leg. Fore wing with a rather short hairless line extending from a point opposite to the middle of the marginal vein obliquely to opposite the base of same and to about the middle of the wing; this is completely isolated from the surrounding ciliation and commences about four lines of ciliation from the middle of the marginal vein. Hind or second wing with from twelve to fifteen scattered, fine lines of ciliation, its caudal fringe longish.

One female reared from *Agromyza phaseoli* by Mr. Ross, of the Queensland Department of Agriculture, May 1st, 1912, Glasshouse Mountain.

Apparently Dodd, in the Transactions of the Royal Society of South Australia, xli., 1917, pp. 356-357, described this variety without name, giving also a description of the male, which is valuable. Some time ago I had access to his material, but had not gotten around to it; subsequently, on coming upon this note of newness, I hunted for it with the object of comparing the specimens. However, they could not be found. But I think his description is clear enough, and that his specimens were this species and variety. I have so recorded.

Anagyropsis cinctithorax nov.

Aeneous, the wings hyaline, the following parts golden: A line across the cephalic frons, mouth, a line down the face between the two just outside of the antennae, antennae except dorsal scape and dorsal pedicel; pronotum, propleurum (continuously), tegulae except apex, fore legs except ventral femur and the coxae, rest of the legs except the coxae; a spot below the middle knee and a longer one on middle tibiae toward apex, hind femora except ventral margin; and the dorsal hind tibiae. Venation dark, the marginal vein slightly longer than wide, the stigmal much longer than it, a bit exceeding the postmarginal. Wing ciliated to base. Dorsal thorax pilose. Lateral ocellus near eye, distinctly farther from its mate than from the median, the frons wide. Scape short and strongly clavate, about twice longer than wide, moderately dilated. Segments of the funicle globular-quadrangle, somewhat shorter than the pedicel, the club about half the length the funicle. Palpi pale except the fourth of the maxillary. Hairless line closed caudad by 3-4 lines of cilia.

The male has the entire face except the median line nearly to the mouth, the antennae and the lower fourth of the head golden, the segments of the funicle a bit longer than wide, exceeding the shorter pedicel, the club unjointed, the flagellum with moderately long, bristly hairs. Described from many specimens reared from a new species of *Cleptes*, Taroom, Queensland, the host upon brigalow, October 31, 1931, Austin Theobald and J. A. Weddell.
Tetrastichus palgravei Gir.

On account of the rapid changes in respect to the knowledge of the Chalcididae, it has been my practice to be constantly revising descriptions. I have found that what is valuable in respect to one genus is not so in another; that often the very character necessary to know has been neglected heretofore; e.g., in *Spalangia*, an old genus, who can now recognise any of the species, especially those of Europe? The essential characters to know have never even been mentioned. I need not apologise farther for this note upon this Javanese species.

The fore and middle femora are yellow. There is no postmarginal vein. The metatarsus is about four times longer than wide, equal to the second segment, but the third and fourth segments are shorter (hind legs). The second wing bears fourteen lines of cilia. Fore wings wide, densely, finely ciliate. In reference to this latter, discal ciliation, one character often occurs that is seldom noted, namely, whether or not the so-called basal and cubital nerves are present (of Foerster). Whatever their value may prove to be (I think they may prove to have inter-family significance), in genera and species they are often of great importance. I am working along that line just at present in reference to classification of the families. But to be short, here in this species, the basal nerve meets the cubital in a point and bears five cilia; after meeting, the two continue proximad for 1 cilium. Of the bristles of the sub-marginal vein none were seen, but one is probably present. This character seems to me very indeterminate; and the material I have does not allow much to be done. However, this character should not be neglected.

In the original description of this species, as printed, the following corrections are necessary: Line 1—*hind femur* 1 should have been *hind femur and femur* 1; line 4, *ovate* should have been *acute*.

Mesastymachus keatsi nov.

From the genotype: Scape much convexly dilated, hemispherical-clavate; purple except the vertex, distal half of the scutum and the scutellum, these orange; tibial tips and the spur, metatarsus and the middle tarsi and

the knees, pale. Venation dark. Segment No. 1 of the funicle square, No. 2 slightly shorter, No. 3 shortest, a half wider than long, the rest square and exceeding No. 1. Jaw teeth well-formed, acute, equal. Pedicel nearly twice longer than wide (apex). Hairless line closed, 12 lines of cilia proximal to it. Ovipositor inserted at base. Palpi 3- and 4-pointed. Male all purple except the very elongate yellow club, tibial tips, middle tarsi, the spur and the knees. The single funicle segment is wider than long, shorter than the pedicel: club exceeding by much the rest of the antennae, unjointed, antennae 4-jointed. In the female, the frons is wider and the eyes smaller. The peculiar male is noteworthy. One male and two females reared from *Tachardia melaleucæ* at Perth, West Australia, by Mr. L. J. Newman, the Government Entomologist. Two more females have been seen; and there are two more species of the genus known, all Australian.
Eupelmus fuligispina nov.

In the whole continent of Australia there are over a score species of the genus with a fuscous band from the marginal vein, this either divided by a hyaline band, or bearing a pair of eye-spots or ocellae. In the former group still another species has been added, characterised by its close affinity to the others. It bears *black* middle tibial spurs. It is the one hundred and thirty-first species of the genus (now united with *Anastatus*).

In my diagnosis of the genus it runs out to *redini* (the male with concolorous legs except tarsi), but differs thus: The ovipositor is dusky at basal half; the middle tarsi are not red nor the spur, the latter longer in *redini* and dark only at tip; the first tarsal joint is shorter, subequal (dorsad) to the spur: middle tibia not red at tip as in *redini*; and farther, the segments of the funicle differ in that segment No. 2 is shorter, being only two and a half times longer than wide and subequal to the pedicel, Nos. 3 and 4 equal and slightly longer than wide, shorter than the pedicel. The male is all blue except the first three segments of the middle and hind tarsi, the fore and middle knees and the middle tibial spur, these white, the rest of the tarsi brown.

Reared from (actually found upon the clusters of, later reared from the three specimens so found, all females), the eggs of *Ochrogaster contraria*, Walker, The Boree Moth, Lecton, New South Wales, November 19, 1936, by Dr. G. Currie, of the C.S.I.R., Canberra.

Amongst the relatives of this species, there are some notorious pest parasites, including several from cock-



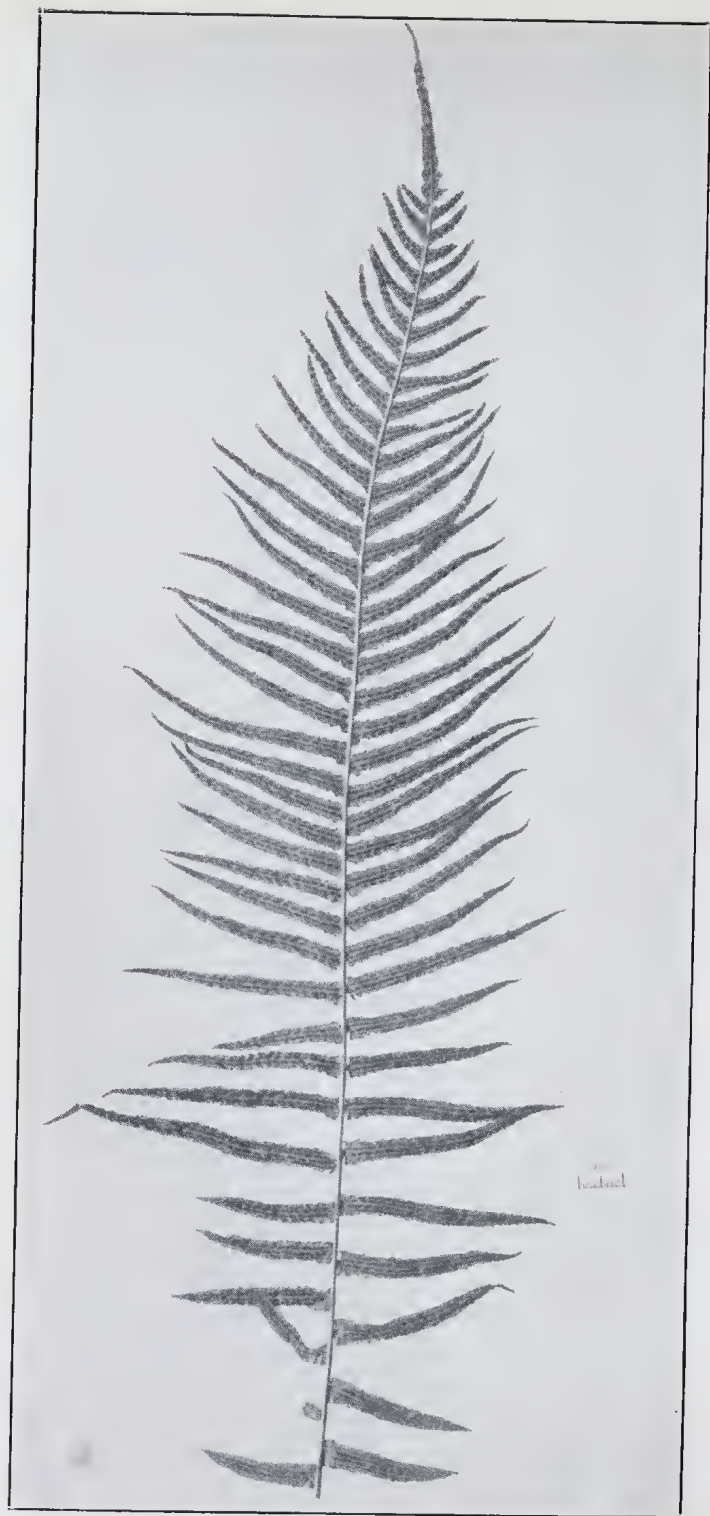


Doodia caudata R. Br.

- 1 and 2. var. *lomarina* F. v. M.—sterile and fertile.
3. Normal form.
4. var. *laminosa* F. v. M.



Doodia caudata R. Br., var. *dimorpha* Domin.



Doodia media R. Br.

roaches. Amongst the latter, indeed, there is a multi-coloured form very common in Queensland (only, so far) and often seen in houses, hotels and restaurants, quick-jumping and difficult to catch; the male, which I have just succeeded in rearing, is so much like another from the eggs of 'roaches in Africa (Ferriere, 1930), that upon reading of the latter I was astounded to find them distinct. How rich in Australia is this grand group which I have succeeded in monographing! I mean the whole super-family, over three thousand strong.

THE RASP FERNS OF AUSTRALIA.

By D. A. Goy, Botanic Museum and Herbarium, Brisbane.

Among the most common of all Australian ferns are the Rasp Ferns or *Doodias*, so named on account of the scabrous or prickly nature of the fronds. Most of the species are common in the eastern portion of the continent from Cape York to Tasmania, but one—*Doodia maxima*—is confined to New South Wales. They relish the shade and dampness of the rain-forest tracks and clearings, forming a dense growth on the "scrub" floor. In drier forest country Rasp Ferns are often found completely covering shady creek banks, *D. aspera* commonly forming a pure dense stand, though frequently this species is intermixed with *D. media* and the polymorphic *D. caudata*. Some of the forms prefer the very dry open Eucalyptus forest, and in such places the plants are usually more scattered and the fronds of a more rigid coriaceous character.

GENERIC DESCRIPTION.

Sori oblong, superficial, usually curved, arranged in one or two rows on each side of and parallel to the costa, distinct or confluent and covering most of the under surface *Lomaria*-like; indusium of the same shape as the sorus, laterally attached to the veinlet and opening inwardly.

Rhizome erect; stipes tufted, robust, not articulate to the rhizome; fronds deeply pinnatifid or pinnate; veins anastomosing, forming one or two rows of areolae between the midrib and margin.

KEY TO THE SPECIES.

Fronds pinnatifid, the segments all adnate to the rachis or the lowermost pair free and often elongated.

Sori in 1 row on each side of and ap-

pressed to the midrib; lowest segments smaller, sometimes free; lateral veinlets numerous, very fine, less than 1 mm. apart at the margin 3. *maxima*

Sori more distant from the midrib, in one or two rows on each side, sometimes confluent covering the whole under surface; lateral veinlets rather distant.

Fronds all similar, broadest in the middle, the segments all adnate to the rhachis, the lowest much reduced, or rarely a large free pair of pinnae at the base; sori distinct.

Fronds broadly elliptic, up to 45 cm. long and 8 cm. or more broad; apex not elongated 1. *aspera*

Fronds linear-oblong, 2.5-2.75 cm. broad; apex elongated .. 1. var. *angustifrons*.

Fronds more or less linear, 2-5 cm. broad, the fertile segments more distant, narrower; lowest pair often free and abruptly elongated; sori confluent 2. *heterophylla*

Fronds pinnate at least in the lower part, the pinnae distinct; sometimes the upper part undivided.

Fronds undivided for the most part, with a few short broad pinnae below 4. var. *laminosa*

Fronds divided for the most part, but frequently with a long terminal segment.

Plants small and decumbent or subdecumbent; fronds pinnate below the middle, narrow-linear, texture membranous to subcoriaceous.

Sori close but distinct.

Fronds about 3 cm. broad, subdimorphic; sterile fronds broader than the fertile .. 4. *caudata*

Sori confluent, covering the under surface Lomaria-like.

Fronds very dimorphic, 1-2 cm. broad, the sterile ones very short and subdecumbent, fertile ones twice as long, erect 4. var. *dimorpha*

Fronds subdimorphic, the fertile ones somewhat longer than the sterile 4. var. *lomarina*

Plants erect, robust; fronds broadly elliptic or oblong-lanceolate; texture coriaceous; fronds pinnate only at base.

Middle pinnae 3 cm. long, rarely longer, obtuse or shortly acuminate

5. *media*

Middle pinnae 5-8 cm. long, long-acuminate

5. var. *Moorei*

DESCRIPTION OF SPECIES

1. *D. aspera* R. Br. Prodr. 151 (1810); Queens. Fl. VI., 1967 (1902).

Stipes robust, scabrous, about 4-12 cm. long, clothed especially at the base with blackish narrow scales; fronds coriaceous, without the stipes averaging 20-35 cm. long and about 4-10 cm. broad in the middle, elliptic-oblong or lanceolate in outline, pinnatifid almost to the rhachis into numerous segments, the rhachis very scabrous and clothed with a few short blackish scales; segments confluent, adnate to the rhachis by their broad bases, linear-lanceolate, obtuse or subacute, falcate, longest in the middle of the frond and decreasing gradually towards each end, the basal ones forming very short, triangular wing-like lobes to the rhachis; occasionally an elongated free pair of pinnae is developed at the base; margins all spinulose-serrate; sori oblong, in 1 or 2 rows on each side of the costa between the midrib and margin.

A very robust form of this species common at the head of Dalrymple Creek and on the Mistake Plateau has fronds 26 cm. broad in the middle, although not more than average length.

Distribution.—Queensland, New South Wales, Victoria and Norfolk Island. In Queensland this species is widespread in the southern part of the State, rare in the tropical north-eastern portion.

Domin (Bib. Bot. 85, p. 121, 1915) described the var. *angustifrons* from Tambourine Mountain. This differs essentially from the typical form mainly in its smaller size, and it is doubtful whether it is worthy of varietal rank.

2. *D. heterophylla* Domin in Bib. Bot. 85, p. 121, 1915.
D. aspera R. Br. var. *heterophylla* F.M. Bail. Fern World Austr. 51 (1881), Queensl. Fl. VI., 1967 (1902).

Stipes slender, very short, slightly scabrous, clothed with a few dark, narrow scales towards the base; fronds dimorphic, narrow-linear, 30-45 cm. long and 2.5 cm. broad, scabrous, subcoriaceous, deeply pinnatifid, the segments all adnate to the rhachis by their broad bases or occasionally a free longer pair of pinnae produced under the very small basal ones; sterile segments rather broad, closely confluent; fertile ones rather distant, much narrower, the fronds terminating in a narrow, caudate apical segment; sori mostly in a confluent line, and eventually covering most of the under surface.

Distribution.—South-eastern Queensland: Blackall Range, Maroochie, Eudlo, Yandina, Buderim Mountain, Mooloolah Scrub, Candle Mountain.

3. *D. maxima* J. Sm. Bot. Mag LXXII., Comp. 27 (1846).

D. blechnoides A. Cunn. in Hook. Comp. Bot. Mag. II., 355 (1836); Benth. Fl. Austr. VII., 741 (1878).

Plant with an erect arborescent caudex up to 30 cm. high and 2.5 cm. thick; stipes tufted, scabrous at the base, more or less clothed with narrow blackish scales; fronds up to about 60 cm. long with the short stipes, and 16 cm. broad in the middle, deeply pinnatifid with the segments closely confluent and adnate to the rhachis by their dilated bases or with a few free pinnae at the base, lanceolate in outline, gradually narrowed towards each end, the terminal segment short; upper segments close, linear-ensiform, acuminate, coriaceous, margins spinulose-serrulate; basal ones more distant and gradually shortened; sori oblong, distinct, always in one row on each side of and appressed to the midrib.

Distribution.—Confined to New South Wales: Nepean River, Cedar Creek, New England, Warraburra River. Apparently very rare.

4. *D. caudata* R. Br. Prodr. 151 (1810).

Fronds weak on slender, usually smooth stipes of variable length, narrow linear-lanceolate in outline, submembranous to chartaceous in texture, with the stipes about 30 cm. long, but often shorter or longer, about 3 cm. broad or frequently narrower, pinnate often above the middle, uppermost segments confluent and adnate to the rhachis, the apical segment elongate, narrow-linear; free pinnae more distant and gradually smaller towards the base, the fertile ones slightly narrower and further apart; all segments linear-oblong, obtuse, margins spinulose-serrulate; sori in 1-2 rows on each side, close but distinct.

Distribution.—Widely spread over all the eastern portion of Queensland; also in New South Wales, Victoria, Tasmania, New Zealand and New Caledonia.

var. *lomarina* F.v. Muell. Frag. V., 130 (1866).

Differs from the type in having confluent sori which eventually occupy the greatest part of the surface.

Distribution.—South-eastern Queensland: Maryborough, Brisbane.

var. *laminosa* Fv. Muell. Frag. V., 130 (1866).

Fronds entire for the most part, with a few short, broad pinnae below; sori eventually confluent, covering the under surface Lomaria-like.

Distribution.—Eumundi, S.E. Queensland; Parramatta, New South Wales.

var. *dimorpha* Domin in Bib. Bot. 85, 124 (1915).

Fronds very dimorphic, narrow-linear, the sterile ones subdecumbent, short with broad close pinnae, the fertile ones erect, about twice as long with longer, more distant, narrower pinnae; sori confluent.

Distribution.—South-eastern Queensland: Tambourine Mountain, Flinders Peak, Blackall Range, Camp Mountain (near Brisbane); North-eastern N.S.W.: Brunswick River (near Mullimbimby).

5. *D. media* R. Br. Prodr. 151 (1810).

D. caudata R. Br. var. *media* Benth. Fl. Austr. VII., 742 (1878). F. M. Bail, Queensl. Fl. VI., 1967 (1902).

D. aspera R. Br. var. *media* F. M. Bail, Fern World Austr. 52 (1881).

Plant much more robust and taller than any of the preceding allied species; fronds with the stipes from 30-50 cm. long and 4-6 cm. broad; stipes usually clothed at the base with narrow blackish scales; fronds with the upper segments confluent and adnate to the rhachis by their broad bases, segments linear, falcate, below the middle gradually shorter and broader, and eventually at the base becoming short, broad, obtuse, often auriculate, rather distant, free pinnae; sori distinct, usually in 1 row but often in 2 rows on each side of the costa.

Distribution.—Common along the east coast of Aus-

tralia from Cape York to Tasmania; also in New Zealand and Polynesia.

var. *Moorei* Bak. in Hook.-Bak. Syn. Fil. (2nd ed.) 482 (1874).

D. caudata R. Br. var. *Moorei* Domin Bib. Bot. 85, p. 126 (1915).

Differs from the type in its broadly elliptic fronds, the segments acuminate, middle ones about 5-8 cm. long and 3-5 mm. broad.

Distribution.—Widely distributed throughout eastern Australia. In Queensland specimens have been collected from the Johnstone River in the north to Lamington National Park in the far south.

THE QUEENSLAND NATURALIST

JOURNAL OF THE QUEENSLAND NATURALISTS' CLUB
AND NATURE-LOVERS' LEAGUE

VOL. XI

JUNE 1939

No. 2

PROCEEDINGS.

ANNUAL MEETING, Monday, 20th February, 1939.

—The President, Dr. D. A. Herbert, occupied the chair. About fifty members and visitors were present.

The minutes of the previous meeting were read and confirmed.

The Annual Report was read by the Hon. Secretary and adopted. It showed that the usual activities of the Club had been maintained during the year.

The Financial Statement, showing a credit balance of £53/17/9, was presented by the Hon. Treasurer, and adopted.

A report was also received from the Hon. Librarian, who noted increased activity in the borrowing of books and magazines by both town and country members. The report was adopted.

Office-bearers were elected for the year 1939 as set out on the inside page of the front cover.

Mr. G. L. Jackson took the chair and called on Dr. D. A. Herbert, the retiring President, to read his Presidential Address on "Subterranean Plant Life." A vote of thanks was moved by Mr. J. E. Young, seconded by Mr. G. H. Barker, and carried by acclamation.

Exhibits were tabled by Miss Cock—bones from the head of the cat-fish; and Dr. E. O. Marks—entomological specimens.

EVENING MEETING, Monday, March 20th, 1939.—The President, Mr. G. L. Jackson, was in the chair, and 44 members were present.

Mrs. Robertson and Miss Connah were elected members of the Club.

Mr. H. A. Longman, Director of the Queensland Museum, gave a most interesting address based on his personal experience in that institution.

EVENING MEETING, Monday, April 17th, 1939.—The President, Mr. G. L. Jackson, occupied the chair, thirty-six members being present.

The following nominees were elected to membership: Misses Hannah, Scott and Wyatt, Mrs. H. E. Young and Messrs. F. E. Epps and J. Saint-Smith, B.Sc.Agr.

Reports were received of the various activities connected with the Easter Camp on the Upper Albert River. Several exhibits were tabled by Mr. J. E. Young, including specimens of polished cedar, a photograph of a stinging tree, and a specimen of "Crow's Foot" grass that had grown through a bitumen roadway. Miss Cook exhibited a variety of yam.

Photographs of the Easter Camp were also on view.

ANNUAL REPORT

The Council of the Queensland Naturalists' Club submits the Thirty-third Annual Report of the work of the Club.

MEETINGS.—Nine monthly meetings, one special meeting, eight field excursions, one basket picnic, and ten Council meetings were held. Attendance at Council meetings was as follows:—Dr. Herbert 9, Mr. Jackson 9, Mr. H. E. Young 9, Dr. Bryan 7, Miss Baird 10, Miss Clarke 9, Mrs. Jackson 7, Mr. Barker 9, Dr. Marks 7, Mr. J. E. Young 8, Mr. Jack 8, Mr. Sanderson 4, Mr. White 7.

The attendance at monthly meetings was good, the average being 40. Lectures on various branches of Natural History were given by several members, namely, Dr. Herbert, Messrs. A. R. Brimblecombe, B.Sc., H. E. Young, M.Sc.Agr., C. T. White, J. E. Young, W. Arundell, F. A. Perkins, B.Sc.Agr., and S. T. Blake, M.Sc.

Specimens of Natural History objects were tabled and notes of interesting observations were given by members, including Miss Cook, Mrs. Thomson, Mrs. and Miss Williams, Drs. Bryan, Herbert and Marks, and Messrs. H. Tryon, J. E. Young, G. H. Barker, J. H. Simmonds and Ken Jackson.

Saturday afternoon excursions were made to Whiteside, Moggill Scrub, Sunnybank and Sherwood Arboretum. All day trips were made to Beerwah and Lake Manchester. A week-end trip was made to Bribie Island. The Easter holiday was spent at Coolumb. A basket picnic was held at Cash's Crossing to wish Mr. and Mrs. White an enjoyable visit to England. The Easter Camp was well attended, 44 adults and 11 children being present. Some interesting work was done in a locality new to many members. The trip to the plantations of the Forestry Department at Beerwah was most interesting and was well attended, but the shorter trips were not well attended, possibly as the localities are well known to many members.

MEMBERSHIP.—Membership now stands at 123, of whom 6 are honorary members, 90 town members, and 27 country members. Resignations have been received from 15 members. Eight new members have been elected.

"THE QUEENSLAND NATURALIST." — Four issues of the Club journal have been published during the year.

NATURE LOVERS' LEAGUE.—A great amount of work has been done among school pupils and visitors to the Museum by Mr. Bevington and members of the staff at the Museum. Many children have signed the League pledge, and have purchased copies of the certificate, which has been re-designed and of which a new issue has been printed.

GENERAL.—The attention of the City Council was drawn to the neglected state of the Bora Ring at Nudgee. The Council repaired the fence, and Mr. Ken Jackson cleaned the Ring.

Dr. Marks called attention to the killing of wallaby at Caniapa, and suggested that the Department of Agriculture should be asked to take any necessary action.

Protests against the filling in of the Sandgate Lagoon and the making of a motor road through the Botanic Gardens were made to the City Council.

D. A. HERBERT, President.

E. E. BAIRD, Hon. Secretary.

LIBRARIAN'S REPORT.

The Library continues to be a satisfactory adjunct to the Club.

Most town members make use of the facilities afforded, and books and magazines are borrowed regularly.

Country members are catered for as usual, by parcels of magazines and pamphlets, despatched at intervals by the Secretary.

During the year a number of interesting books have been added to the Library, and have proved very popular.

From 21st February to 21st November, 1938, 52 books and 136 magazines have been lent to town members.

Many thanks are due to those members who have so generously donated books and magazines to the Library, as suitable gifts of this kind are always a very welcome addition to our well-used stock.

E. M. JACKSON, Hon. Librarian,

TREASURER'S REPORT.

The following is the Statement of Receipts and Expenditure for the Club for the year ended 1938.

RECEIPTS.

	£	s	d
Balance forward from 1937	86	6	8
Members' Subscriptions	47	15	6
Sales, Nature Lovers' Certificates	26	12	0
Grant from Government—Reprint of same	10	0	0
Donation, Library	0	13	0
Tent Hire	1	0	0
Sale of Old Tent and Flys	1	19	6
Sale of "Queensland Naturalist"	0	5	0
Interest on Account at Bank	1	13	7
Balance, Easter Camp Funds	1	3	5
	£177	8	8

EXPENDITURE.

	£	s	d
Rent, Women's Club Room	11	5	0
Insurance	0	5	6
Telephone	3	7	7
Petty Cash	12	0	0
Subscription, Bailey Memorial	1	1	0
Sundry Debtors—			
Barkers' Bookstore, Magazine Subs.	1	7	0
Books for Library	2	18	0
	4	5	0
Clark & Mackay—Printing "Naturalist"	40	15	4
Govt. Printing Office—Nature Lovers' Certificates	36	8	0
Nielsen, N. P. C.—Purchase of Tents	13	10	0
Relyans & Lanhams—Repairs to Tents	0	6	6
Smith, G.—Repairs to Tents	0	7	0
Balance in Bank	53	17	9
	£177	8	8

(Sgd.) H. CLARKE, Hon. Treasurer.

(Sgd.) C. W. HOLLAND, Hon. Auditor.

You will notice that the bank balance is lower than for the same period last year by an amount of approximately £32.

On the Receipt side of the Statement, members' subscriptions yielded about £3/15/- less to Club funds this year, though practically all subscriptions have been paid. While on this matter, I very much regret to inform you that the Council has found it necessary to cross off our membership roll, names of six members who have remained unfinancial for some years.

On the Expenditure side, there has been a big increase in the cost of printing the "Naturalist," which has been enlarged and illustrated. This amounted to £8, but I think you will agree with your Council that it was worth it.

Also this year it was decided to spend portion of the Club's funds on some very necessary camp equipment, and this cost us £13/10/-. Against such expenditure we had been building up a small reserve account from previous Easter surpluses, tent hire and such items, and for your information this account is as follows:—

TENT ACCOUNT.

	£	s	d		£	s	d
1937—				1938—			
Balance Forward ..	7	18	0	Purchase of New Equip- ment	13	10	0
1938—				Repairs to Tents	0	13	6
Tent Hire	1	0	0				
Sale of Old Tent and Flys	1	19	6				
Balance, Easter Camp ..	1	3	5				
	£12	0	11				
Tent A/c. Owes Club Funds	2	2	7		£14	3	6

This amount we will probably get back at Easter as there is generally a small surplus left after all expenses are paid.

Another extra item of expenditure this year was for some necessary new books for the library.

Finally, I will draw your attention to the items concerning Nature Lovers' Certificates.

As you know, at one time this was a distinct body which was absorbed by us in 1936, together with a fund of £14/18/10, which since that time has been part of our total bank balance, though it does not belong to us as a Club. During 1936 and 1937 the sales of Certificates only amounted to 7/8, but owing to the efforts and enthusiasm of both Mr. H. A. Longman and Mr. Bevington, late Inspector of Schools, who talk to the children at the Museum, considerable numbers of these young folk have been interested in the idea of saving instead of maiming bird and animal life, and the sales of the Certificates have increased this year to the amount of £26/12/-, and all in pennies; that is, 6,384 children have signed a Treaty of Peace with the Wild Life of Australia.

It was necessary to get a new issue of the Certificates, which we did, and it cost us £36/8/-, less a grant from the Government of £10. The money comes back to our account as the Certificates are sold, but it does not belong to the Club as such. The Nature Lovers' League Certificates Account, therefore, is as follows:—

	£	s	d		£	s	d
Balance brought into our Account, 1936 ..	14	18	10	By Govt. Printing Office, Reprinting of Certi- ficates	36	8	0
Sales of Certificates—				„ Balance in hand ..	15	10	6
1936/7	0	7	8				
1938	26	12	0				
Grant from the Depart- ment towards cost of Printing Certificates ..	10	0	0				
	£51	18	6		£51	18	6

This amount of £15/10/6 is included in our balance of £53/17/9, which actually leaves the Clubs own fund £38/7/3.

H. CLARKE, Hon. Treasurer.

SUBTERRANEAN PLANT LIFE.

(Presidential Address delivered before the Queensland Naturalists' Club, February 20th, 1939.)

By D. A. Herbert, D.Sc., Queensland University.

Life in a plant community is a continual struggle against environment; and in that environment other plants are often the most relentless competitors. In cultivation plants from the most varied habitats are brought together, and freed from competition, they flourish under conditions very different from those under which they grew in nature. Certainly there are great differences in the requirements of different species from different soils and climates, but soils and climates are not the only factors in the distribution of species. A plant may be occupying a habitat that is by no means ideal, because it is excluded by competition from the type of country most favourable to its growth and reproduction. In other words, the conditions under which it grows in nature are not necessarily the ideal conditions for its existence, any more than a kerosene tin hut is the ideal residence for a man forced into relief work by competition on the labour market.

In coastal Queensland rain forest often grows in the moist gullies and on the more retentive soils, leaving the drier positions to the Eucalypts. It is not that the Eucalypts necessarily thrive better in the drier positions; many of the most straggly species develop into fine specimens when they are given better conditions from which they are excluded in nature. The Western Australian red flowering gum (*Eucalyptus ficifolia*) grows in twisted thickets near the coast to the west of Albany, but apart from its brilliant flowers, is a most unprepossessing tree. Yet given reasonable attention in a garden or in an avenue, it develops into a fine, shapely specimen.

The characters which enable a plant to tolerate or flourish in some particular environment constitute its adaptations to those conditions. There are many characters which are obviously of advantage, for example, the breathing apparatus of mangrove roots which solve the problem of aeration in a soil which is constantly waterlogged, the high osmotic pressure of many plants of saline regions, and the rapid growth of climbing plants in the poorly lighted rain forest. These are some of the devices which enable their possessors to survive where

others would perish, and they are undoubtedly of prime importance. They should not, however, be made the basis of the argument that all peculiarities of growth or structure are of equal value, or even of any special value at all in adapting the plant to its environment. Dr. Cuthbert Hall, for example, considered that the chemical composition of the essential oils of the Eucalypts of the highlands in southern New South Wales had enabled them to climb the mountains after the Kosciusko uplift. Eucalyptus oils are end-products, and have passed out of circulation in the plant's metabolism, so that it is extremely unlikely that they could have any such function. Perhaps this is an extreme example. There are many others, however, which at first sight seem very reasonable until they are examined experimentally. Plants which are capable of enduring a prolonged drought without injury—the xerophytes—have many special anatomical characters, such as toughness and leatheriness of leaves, hairiness, and so on. These are often explained as adaptations for the reduction of transpiration. Yet it has been shown that many plants with these peculiarities of structure are able to give off water at as rapid a rate as other plants, and in some cases more rapidly. A Russian plant physiologist, Kusmin, found such xerophytes as *Alhagi camelorum* and *Medicago coerulea* remained green in the desert near Baku, on the Caspian Sea, when all other plants had dried up; but that these plants had a transpiration intensity twice that of the ordinary sunflower. There is a discrepancy between leaf anatomy and foliar transpiring power which has led such workers as Shreve, Pool, and others to consider that the one does not account for the other. A slow transpiration is certainly found in cacti, which are fleshy and have a very greatly reduced surface, and in *Xanthorrhoea*, in which the stomata are very deeply sunken; but in general the transpiring power of xerophytes is not obviously bound up with their supposed adaptive leaf structure.

Above-ground parts, however, are only portion of a plant, and in considering the adaptations to any particular habit, the subterranean parts should be considered in equal detail. It must be remembered that many plants die down to the ground every year, but carry on to the next season by dormant or relatively dormant underground organs—bulbs, tubers, rhizomes, and such structures. In such plants it is the subterranean part

which has the really efficient adaptation to inclemency of climate. The decisive battles between species or between plants and their sub-aerial environment are often fought beneath the surface of the soil.

If we could view the subterranean landscape we would find it as richly varied as that of the surface—tangled masses of shallow roots, deeply penetrating tap-roots, gnarled subterranean creeping stems, dormant bulbs, corms and tubers, and a teeming population of scavengers, parasites and stray visitors. The soil seethes with life; it is a dynamic system changing from hour to hour, from season to season, and from year to year.

The size of subterranean parts of plants is often surprising. The Western Australian Christmas Tree is about 20 feet in height, but what are apparently trees are really branches of a subterranean trunk, sometimes hundreds of yards in length; it is actually a giant amongst trees, but being underground it is not noticed. Even the common pumpkin may have several miles of roots. Sorghum is a plant which has a smaller leaf surface than maize, but area for area its leaves transpire more water. Measurement has shown that it has a much larger number of fine roots to supply the leaves. Herein lies one explanation of the greater transpiring power of many xerophytic plants; their above-ground parts are the organs which get rid of water, but their root systems supply it.

The normal functions of roots are to obtain water and inorganic salts from the soil, and to act as anchoring organs; but in many cases they either fortuitously or habitually assume extra duties. Natural grafting between roots of the same individual is the rule in the strangling figs or banyans, whose roots anastomose to form a trunk; but it is also commonly observed in up-rooted trees of other species. There is much more opportunity for this fusion in the soil than there is between branches, where the union may be disturbed by wind. In the individual, root grafting probably has no value, but when the root systems of adjacent plants become fused at a sufficient number of points, the transfer of food material from one to another may be of great importance. A case is on record where, after a *Eucalypt* was cut down, the stump healed over and continued to live without leaves. (This happened in the Gladstone district, and was recorded in the proceedings of the

Royal Society of Queensland by A. Norton in 1886.) The stump was not uprooted to verify the theory that its roots were grafted to those of an adjacent tree, but in view of the fact that root grafting is common in Eucalypts it seems a reasonable explanation.

Habitual root parasitism, as distinct from more or less haphazard and dispensable root grafting, characterises a considerable number of flowering plants belonging to different families. Special suctorial organs, the haustoria, are developed and rob the host plants of water, inorganic salts, and organic food materials. This habit is highly specialised and the plants must have a host. It is, however, a habit which has arisen independently in different families, and though the haustoria have the same functions of parasitism, they differ in details of their structure. In the family Scrophulariaceae self-supporting plants such as the snapdragon, perstemon and veronica are in the majority, but the evolution of two tribes, the Gerardiae and the Rhinanthaeae, has been along parasitic lines; *Stiga*, the sugar cane parasite, *Melampyrum*, *Bartsia* and *Euphrasia* are common examples. The family Santalaceae, with about 250 species, is parasitic, and in some species haustoria are often found attacking almost any root with which they come into contact, even their own. *Exocarpus cupressiformis*, the native cherry, was the first Australian species to be investigated. Later investigations showed that all the Australian species examined had the same habit, but to a different degree. Some were very catholic in their taste, but others had a very narrow range of hosts, one species being apparently restricted to one particular plant only. Extreme specialisation of this sort means that the existence of the species is somewhat precarious unless the host is common. Two important Australian santalaceous parasites are the sandalwood (*Fusanus spicatus*) and the quondong (*F. acuminatus*). The sandalwood is parasitic on mulga and other acacias for the most part, and the recognition of this fact makes possible its commercial cultivation. It is of no use to plant its seeds in cleared land; they must have a nurse-tree to parasitise. The Indian sandalwood (*Santalum album*) is also parasitic, but it has a range of several hundred host species in its native rain forests. Before the spike disease of this important plant was understood, it was suggested that perhaps in its wholesale attack on its neighbours the sandalwood struck one which caused some derangement of

its metabolism; it is now known that "spike" is a virus disease.

The mistletoe family consists almost entirely of stem parasites, but in Australia we have two terrestrials—*Nuytsia* (the West Australian Christmas Tree) and *Atkinsonia*. *Nuytsia*, already mentioned as a tree with a trunk longer than that of any erect tree, parasitises almost any root that it encounters. Not uncommonly it will send its roots into a vegetable patch and attack a whole row of carrots. *Atkinsonia* is a New South Wales species which has not yet been investigated, but would repay examination.

The root habits of the genus *Olar* of the family Olacaceae have not been exhaustively examined in Queensland. *Olar imbricata*, of the Philippine Islands, has haustoria as large as those of the sandalwood, and one of our Queensland species, *O. retusa*, though having smaller haustoria, is definitely parasitic. Just to what extent root parasitism is developed in this family remains to be shown; it may be worth while to examine *Ximenia americana*, the yellow plum, and even members of the related family, *Icacinaceae*, to which belong the common rain forest trees *Villaresia Moorei* (Churnwood) and *Pennantia Cunninghamii* (Brown Beech).

Under the Bentham & Hooker system of classification, a remarkable American genus, *Krameria*, was included in the Leguminosae. *Krameria canescens* is a sort of parasite which has been examined in detail by Cannon. Its placing in the Leguminosae is by no means unanimous. (It is placed in Polygalaceae in the Engler & Prantl system and by Hutchinson).

This root parasitic habit is something otherwise unknown in Leguminosae, which have specialised in another direction, a mutualistic symbiosis with nitrogen fixing bacteria. These bacteria attacking the roots from the soil give rise to galls on the roots; to that extent they must be regarded as disease-producing organisms. The root host, however, has become part of the normal make-up of leguminous plants. The bacteria fix atmospheric nitrogen and on their death the plant receives the benefit of it. Nitrogen is one of the most important elements in plants, but it must be taken in from the soil in combined form. The vast reservoir of gaseous nitrogen in the atmosphere is of no direct use to the ordinary green plant. Experiments carried out under sterile conditions have so far

failed to produce any evidence of exploitation of this source. The legume, however, by entering into partnership with bacteria, which have the faculty of using free nitrogen, has solved this problem. The establishment of this fact in 1888 by Hellriegel and Wilfarth, and the isolation of the bacteria by Beyerinck in 1888, and by Prazmowski in 1890, is one of the most important of modern developments in agricultural science. It led to the discovery that there were a number of races of the root nodule bacterium, each attacking its own group of leguminous hosts, and incidentally benefiting them by fixing nitrogen. These races are specialised in their relationships with the legumes, so that it is possible to have legumes flourishing in a district, and well provided with nodules, so that the soil is well inoculated; and yet an introduced legume may fail because of absence of the race beneficial to it. This has been the experience with lucerne in many countries. The failure of that plant in parts of the British Isles was formerly thought to be due to climatic factors, but since the development of the technique of inoculating seed with the right strain of bacteria at the time of planting, success has been attained in districts where it was once thought lucerne would not grow. We have had similar experience with lucerne and clovers in many districts in Australia, where success has followed the introduction of the appropriate race of nitrogen-fixing bacteria. This need for a specialised race of bacterium is no doubt the explanation of the very slow spread of lucerne in cultivation from the Russian steppes where it is native, in spite of the fact that it has always been held in very high esteem as a fodder plant.

The nitrogen-fixing bacteria of the root nodules are usually not looked on as disease organisms, but that is their primary nature. The fact that they fix nitrogen, which the plant is able to take over from them, is their saving grace, but does not alter the fact of their parasitism. There are non-beneficial strains of the bacterium which cause the characteristic root swellings, but give no counter-balancing benefit. Thus unthrifty clover may have a well-developed nodule supply, and it is only by very careful investigation that the fact is established that the plant has entered into an unprofitable symbiosis.

Root nodules are characteristic of legume roots, but by no means confined to them. Bacteria of the *Pseudomonas radicicola* type have been found in nodules of *Alnus*, *Eleagnus*, *Myrica*, *Podocarpus*, and *Casuarina*.

Dr. McLuckie, of Sydney, has compared those of *Podocarpus clata* and *Casuarina Cunninghamiana* with *Ps. radiculicola*, but does not definitely assign them to that species, though in view of the host specialisation in the bacteria lumped together under this name, such a diagnosis would not be reckless. In Cycads there are curious coral-loid roots at about ground level, and these are regarded by Spratt as receiving the initial stimulus for their formation from *Ps. radiculicola*, though later infection is effected by other soil organisms—species of *Azotobacter* (another nitrogen fixer) and the alga *Anabaena cycadearum*, which forms a definite algal zone.

Bacterial galls on roots are not necessarily an indication of mutualistic symbiosis. There is, for example, the very destructive disease, crown gall, caused by *Ps. tumefaciens*. None of these purely parasitic bacteria are, however, as universally present on any species or group of species as those symbionts of the *Ps. radiculicola* type, on whose presence the host plants have come to rely to a greater or less degree.

An equally important root partnership is struck with fungi. Here again there are all degrees of fungal association with roots ranging from violent parasitism to a benign infection from which the host plant derives benefit which is reflected in its improved general health. Such a root-fungus association is known as a mycorrhiza. The mycorrhizal habit is well known in orchids, Ericaceae, Epacridaceae, Rutaceae, pines, and numerous other plants. The most diverse views are held on the physiological significance of mycorrhizas. Some consider that they represent a mild and comparatively harmless parasitism, others that the fungi are able to exploit organic matter in the soil and hand it over, though not passively, to their symbionts, and that both partners benefit by their association. Evidence has accumulated to show that these fungi are markedly stimulated by their hosts, from which they obtain such food materials as carbohydrates, and that on the other hand the fungi are able to exploit sources of nitrogen not readily available to green plants. Such a partnership is specially valuable in soils deficient in nitrates, such as acid humus soils.

Though orchid seeds can be raised aseptically, that is without any microbial partner, the presence of a fungal symbiont is necessary in nature. The existence of numerous orchids with no chlorophyll, and therefore dependent on ready-made organic matter, suggests in their case an

utter dependence on their fungal partner, unless, of course, it be claimed that these orchids are able to utilise organic matter in the soil through their own unaided efforts. There is no experimental support for the latter view, and with our present evidence it is more reasonable to regard them as plants which show extreme specialisation in the exploitation of the mycorrhizal habit.

In the darkness of the earth there can be no photosynthesis. All organic food material is derived directly or indirectly from the world of light, from the green organs of the earth's surface. Below that flourish only the non-green roots and the teeming host of life forms ultimately dependent on the green plants. A partnership with one or more of these exploiters of the photosynthetic labours of the sub-aerial plant population makes it possible for a flowering plant to become independent of light. We have such leafless orchids as *Galeola* which can grow in hollow logs. It is not too wild a flight of the imagination to suppose that there may be quite a number of subterranean flowering plants, especially in view of the fact that here in Australia two have already been discovered both in recent years. They are both orchids—*Rhizanthella* from Western Australia, and *Cryptanthemis* from New South Wales. Difficulties in the matter of pollination and seed dispersal militate against the success of exploitation of the subterranean habit, and the fact that there are such plants is an indication of the wonderful adaptability of vegetable life.

EASTER EXCURSION, 1939, TO UPPER ALBERT RIVER AND NATIONAL PARK.

GENERAL ACCOUNT.

The Easter excursion was held this year to the same spot as that visited in 1936, on the Upper Albert River, on Edgar Stephens and Sons' property adjoining the Lamington National Park and about 64 miles from Brisbane.

The attendance was about 43 adults and 11 juveniles. The majority of the party arrived at the camp on the Thursday evening. Friday was somewhat showery, and only short excursions and walks were favoured. Saturday broke finer, and a considerable party entered the park, which is here dense "scrub" or rain forest, but owing to a late start and heavy rain following, the main objective was not achieved and members returned at

dark with hearty appetites and wet skins.

Following this some shorter excursions were made to the Razorback, Widgee Creek, and to local caves in the cliffs.

In the evenings entomological work was carried out, and other specimens of botanical and geological interest examined.

Despite a showery week-end a well-satisfied company returned to town on Monday evening ready to resume the usual daily round.

J. E. YOUNG.

ORNITHOLOGY.

Owing to the rather inclement weather experienced on this trip the list of birds noted was not so numerous as in 1936. There were, however, several notable additions to the former list such as: The Lyre Bird (*Menura alberti*) seen in the scrub near the river, the two large feathers of the tail being plainly seen. As these birds usually inhabit the dense rain forest of the border ranges they are not very frequently observed.

A pair of *Podargus strigoides*, or frogmouth, were noted by a party on adjacent trees on Widgee Mountain, both being comparatively low. Close to camp on the river a number of white-browed scrub wrens, double-bar and red-browed finches and yellowrumped tit warblers were fairly tame. Amongst others were the bellbirds (Miners) and eastern whip birds. There were also some crested pigeons, western birds settled in the locality in recent years. In all a total of about 32 species was noted on this occasion.

J. E. YOUNG.

BOTANICAL NOTES.

The camp site was in a cleared area formerly occupied by mixed eucalypt and rain forest. A selection of silky oaks (*Grevillea robusta*), red cedars (*Cedrela toona*), hoop pines (*Araucaria cunninghamii*), Moreton Bay Chestnuts (*Castanospermum australe*), and other native trees had been retained along the banks of the stream. The rain forests in the valley beyond the camp, though cut over for cedar in the past, still contain some magnificent specimens of the species. Other very large trees are Hoop Pine, Box (*Tristania conferta*), Flooded Gum (*Eucalyptus grandis*), and a Moreton Bay Fig (*Ficus Watkinsiana*). In one gully a group of huge box trees was reminiscent of the Giant's Garden across on the

Coomera, near O'Reilly's.

Three years ago an advancing beech forest was examined on Widgee Mountain. Young beeches (*Nothofagus Moorei*) were found in the open eucalyptus forest, and there was undoubted evidence of the relatively recent expansion of the beech community. The spot was not visited on this occasion, but it was learned that bush fires had swept the area last year. It is probable, therefore, that the advance has for the time being been checked. On the cliffs there were extensive patches of the pink flowering orchid, *Dendrobium kingianum*, and in places though old stems had been charred by fire within the last six months, new healthy growth was being produced.

For some reason which is not apparent, lantana has not invaded this valley. Many other introduced plants flourish on the rain forest margin, amongst them passion fruit, tree tomato (*Cyphomandra*) and *Solanum seaforthianum*, while taro, originally planted by the stream, has become naturalised on the banks and even in the stony creek bed. In the pastures many of the rain forest pioneer trees such as *Homalanthus* and stinging trees are reasserting themselves. The two species of stinging tree, *Laportea gigas* and *L. photiniphylla*, commonly have their leaves blotched with downy patches suggestive of a parasitic mould. These are actually abnormal hairs produced as the result of the attack of a mite. The hairs, which are branched, are not impregnated with silica and do not sting, but even the downiest of the leaves still possess enough siliceous stinging hairs to make them as formidable as healthy specimens. In the rain forest the wild ginger (*Alpinia coerulea*) was commonly marked by the black lesions of the fungal parasite, *Phyllachora alpiniae*. Affected leaves become brown and ragged. The horse-hair fungus (*Marasmius equicrinus*) was noted in several instances as killing seedling trees. One dead tree had a magnificent growth of several hundred fruits of the luminous fungus, *Panus conchatus*.

D. A. HERBERT.

ETHNOLOGICAL NOTES.

The area visited during the Easter Excursion to the Upper Albert River was part of the land formerly inhabited by the Chepara tribe, whose country extended from the Logan River to the southern cliffs of the Macpherson Range.

The material collected, though not extensive in range, was quite interesting, and could have been further added to if time had not been so limited.

The first point of interest found was a burial cave in the face of some rhyolite bluffs among the foothills of Razor Back Mountain, or The Lost World. The cave itself—which had been formed by weathering and falls of rock—was so small that only one person at a time could possibly have crept inside. In it were the remains of portion of an aboriginal skeleton, obviously there for many years.

When a person died in this district, it was frequently the custom of the tribe for the nearest female relative, such as the wife, to carry a number of the deceased's bones, including the skull, about in a dilly bag for some months, and then to deposit them in a cave such as this, or in a hollow tree.

The only implement accompanying these bones was a rather ideal form of quartzite scraper or knife, left as a last token by the gin. This implement is composed of pink quartzite, is well flaked and possesses three cutting edges, one of which shows light secondary chipping. It was apparently a custom in the Moreton district to leave a knife with the bones of the departed, as another skeleton collected by myself several weeks ago on the Upper Mary River, was accompanied by a fresh water mussel-shell knife.

On another bluff in the same range of mountains is a shallow rock overhanging at the bottom of the cliffs, used in the old days as a camping shelter. Near this was a beautifully ground stone axe, discarded owing to a break in the butt end. It shows good flaking, and the amount of grinding on the blade is considerable.

At the other side of the Albert River is a similar bluff of rhyolite rock, possessing the usual shallow caves. This bluff is situated just above the rain forest of the river, and is surrounded by open eucalyptus forest, the country being free of undergrowth and altogether a much more favourable camping spot.

At the base of the cliffs is a larger cave capable of holding ten or fifteen people, and running back for some little distance into the rock. It has apparently been worn out by seeping water.

Among the implements found buried in its floor was a stone axe made from a creek pebble roughly flaked into shape. It also had been discarded owing to a badly

broken blade. However, grinding is still noticeable.

The other implements found comprised a mussel-shell knife, and a number of scrapers, including several side and end scrapers, and also one fine example of a half-circular side scraper, which has been very well flaked.

Another is a small triangular point with a ridged back which is a common stone implement right throughout Moreton Bay and the Brisbane district.

G. K. JACKSON.

GEOLOGICAL NOTES.

The excursion this year added little to the observations made on the previous visit to the locality. This was due in part no doubt to the smaller number of geologists, and in part to the comparative inactivity of those present, but mainly to the fact that on the previous visit we had "picked the eyes" of the sections already known to be of interest. That is to say we then went to look at sections rather than look for them. This time we hoped to find new sections. As was expected, the geology did not seem to have changed much in the three years' interval. Keen readers may refer to the notes made then as still applicable.

The chief geological problem, and a very important one, is the relationship of the widely differing types of volcanic rocks to one another and to the Jurassic strata on which they rest and into which they have been intruded.

Sir Roderick Murchison once told the young Geikie that good legs were more important to a geologist than his head.

There is fine scope in the Upper Albert region for a geologist, but with good hands and heart and head, as well as legs, if he is to do justice to the task.

We followed up the river for a few miles, but only met with volcanic rocks either *in situ* or in the river-borne material. Some of the party picked up nice pieces of green jasper—probably the infilling of steam holes in the lava flows.

On another day, on the ridge separating the Albert from Widgee Creek waters, or rather in a gully on the Widgee Creek side, we noted a coal seam in the sandstones forming the ridge. On the previous visit we saw seams in Widgee Creek and in the Albert River.

We were not this time lucky enough to find a section

showing the volcanic rocks in contact with the sedimentary rocks.

E. O. MARKS.

ENTOMOLOGY.

Generally speaking, the insects were not as numerous as on the previous trip held in 1936. Since then many acres of forest have been cleared, reducing the insect population considerably. The long dry summer followed by heavy rains (resulting in the scouring of the creeks) also affected the insects.

As usual the dragon flies (Odonata) were very conspicuous, and species like *Orthetrum caledonienum*, *O. villosavittatum*, *Diplacodes haematodes*, *Synthemis regina*, *Austrogomphus aehraceus*, *Argiolestes icteromelas* were particularly common. Rarer species like *Diphlebia lestoides*, *Synlestes weyersi*, etc., were not seen.

May flies (Ephemeroptera) were very common near the river, and a fine specimen of Siphonuridae was taken at the camp light. This is the first record of this family for Queensland. Two very fine larvae, which are thought to be the larvae of the same species, were found in the gravel in the creek.

The stone flies (Plecoptera) were rare, only two specimens were taken, both at night. They were two species of Leptoperlidae. Many larvae of both *Sternoperla australis* and *Leptoperlidae* were found under stones in the stream.

Only two specimens of *Taeniochorista pallida* (Mecoptera) were found. Usually a number of specimens of this rare and interesting species are caught at Easter.

The only Neuroptera collected were three specimens of *Eidoleon bistrigatus*, the large ant-lion with the peculiar linear marking on the fore wings. In 1936 three or four specimens of a rare species of Osmylidae were taken, but none were seen on this occasion.

The beetles were, as usual, fairly plentiful, but all of those collected were quite common species.

The most interesting fly was a large brown and black tachinid with smoky wings. It has not yet been identified.

The Hemiptera, Orthoptera, and Lepidoptera were numerous, but of no particular interest.

A great deal of time was devoted to studying the Arthropods found under bark and logs. After the heavy rains the water-table was very near the surface, with the result that many forms not usually seen were exposed

when the log was turned over. The outstanding find was four specimens of *Peripatoides leuckarti* Sanger, two mature and two half grown. In 1936 three specimens were found so that the Upper Albert River is evidently a good locality for these rare and interesting Arthropods. A handsome species of Opiliones was fairly numerous. The Opiliones are close relatives of the spiders from which they differ in having a segmented and non-petiolate abdomen. The very long legs and hard body are very characteristic of these rather rare Arachnids. The identity of the species has not yet been established, and probably it will be necessary to send specimens to Europe for identification.

Millepedes and centipedes were common under the stones and logs. Several specimens of Symphyla belonging to the family Scutigerellidae were found. These very primitive, fragile Myriapoda were not common, and considerable patience was required to collect them without injury.

Practically no attempt was made to collect the insects of the rain forest, and perhaps more attention will be paid to them on some future occasion. The locality is an excellent one for the naturalist and well worthy of another trip.

F. A. PERKINS.

NOTES ON PERIPATOIDES (PERIPATUS) LEUCKARTI SANGER.

By F. A. Perkins, B.Sc.Agr.

During the last few years the members of the Naturalists' Club attending the Easter Camp have expressed their surprise at the interest in *Peripatus* shown by the zoologists. It is fairly obvious that they have very little knowledge of this interesting animal, a sad state of affairs in a Naturalists' Club.

The genus *Peripatus* was described in 1826 for some specimens from St. Vincent, and the author, Guiding, probably because of the slug-like appearance of the antennae placed it in the phylum Mollusca. Some of the later zoologists placed it in the phylum Annulata (segmented worms), and others in the sub-phylum Myriapoda (millepedes and centipedes). It is now generally agreed that its true place is in the phylum Arthropoda in a distinct and separate sub-phylum known as Onychophora.

The chief characters which establish its place in the Arthropoda are as follows:—(a) the presence of a pair of jaws; (b) the presence of paired lateral ostia in the long tube-like dorsal vessel; (c) the haemocoelic body cavity, i.e., the whole of the body cavity not occupied by the digestive system and the generative organs is filled with blood; (d) the presence of tracheae, a character not found outside the phylum. On the other hand, the following features show that it has definite affinities with the Annulata:—(a) it has a pair of nephridia in every segment of the body behind the first two; (b) it has cilia in the generative tracts; (c) thin cuticle; (d) a layer of muscles in the body wall; (e) hollow appendages. Moreover it differs from all the rest of the Arthropoda in the following details:—(a) the number and arrangement of the spiracles; (b) the presence of only a single pair of jaws; (c) the texture of the skin; and (d) the simple nature of the body segments. Finally, it has a superficial resemblance to certain Mollusca because of the hollow, sensitive antennae and slug-like body. To quote Sedgwick: "Peripatus, therefore, is zoologically of extreme interest from the fact that, though in the main Arthropodan, it possesses features which are possessed by no other Arthropod, and which connect it to the group to which the Arthropoda are in the general plan of their organisation most closely related."

Recently the Onychophora has been divided into two families, each of which consists of two sub-families. The Australian forms are included in the family Peripatopsidae, sub-family Peripatoidinae. The number of Australian genera and species is doubtful, for some authorities consider that many of the so-called species are really only forms of one species.

Peripatus is very sensitive to light and drought, and spends the day hidden in tiny crevices in damp rotting logs, under stones, under the bark of dead stumps, and probably in the soil. The late Dr. R. J. Tillyard was of the opinion that they kept just above the water-table, rising and burrowing in the soil with the rise and fall of the water. Their food probably consists of amphipods, isopods, collembola, mites, small diplopoda, and insect larvae which abound in their normal habitat. Specimens have been kept alive for several weeks on such a diet. No actual observations have so far been night. When disturbed they have a habit of shooting out with considerable force a sticky slime which comes

from small reservoirs in the oral papillae of the head. According to Hutton, this slime is used for catching their prey.

Peripatus has now been found in the following countries:—South Africa, Australia, New Zealand, New Britain, South America, West Indies and the Malay Peninsula. Generally speaking, the number of species and individuals is remarkably small. Whether this is due to the difficulty of finding them or whether they are very rare is difficult to say. During the last 14 years the following are the only specimens which, to my knowledge, have been found in Queensland. Possibly other specimens have been found, but they have not been recorded. One adult, Dunk Is. (W. Cottrell-Dormer); one adult, National Park (J. H. Simmonds); Upper Albert River, seven specimens (A. Ross, W. Simmonds, M. Grimes, D. Tabrett, P. Marks, F. A. Perkins); one adult, Toowoomba filter beds (N. Yeates); Caloundra (J. L. Groom); Mt. Gravatt (F. Chippindale); Lake Barrine and Fraser Island (R. J. Tillyard); a total of 15 specimens.

Three of the specimens (two adults and one half grown) which were collected recently at the Upper Albert River are still alive, and one of them has given birth to two young. The young were produced at intervals of a week, and soon after birth were about 5 mm. long and greyish white in colour. In three weeks they changed to a brown colour like their parent and doubled their size. An attempt is being made to bring them to maturity.

All the specimens collected during the last few years are either black or brown in colour, and the largest measured about two inches in length. All of them, irrespective of their size, have fifteen pairs of legs.

With regard to their general appearance Sedgwick, who regarded them as animals of exceptional beauty, states: "The exquisite sensitiveness and constantly changing form of the antennae, the well-rounded, plump body, the eyes set like small diamonds on the side of the head, the delicate feet, and above all, the rich colouring and velvety texture of the skin, all combine to give these animals an aspect of quite exceptional beauty. These animals, so far as skin is concerned, are not surpassed in the animal kingdom."

EXCURSIONS FOR 1939.

Saturday, May 13th—Petrie-Murrumba

Saturday-Monday, June 10th-12th—Tamborine Mountain

Saturday, June 17th—Queensland Museum

Saturday, July 15th—Kalinga Park

Saturday, August 19th—Mt. Coot-tha—Wool St. to Dams

Sunday, September 17th—Beerwah—Wildflowers

Saturday-Sunday, October 14th-15th—Bribie Island.

Saturday, November 18th—Clontarf.

THE QUEENSLAND NATURALIST

JOURNAL OF THE QUEENSLAND NATURALISTS' CLUB
AND NATURE-LOVERS' LEAGUE

VOL. XI

SEPTEMBER 1939

No. 3

PROCEEDINGS.

EVENING MEETING, MONDAY, 15th MAY, 1939.

—The President, Mr. G. L. Jackson, was in the chair and about forty-five members were present.

Miss Ewing was elected a member of the Club.

Reports of excursions to (1) Jolly's Lookout and (2) Petrie were given by Dr. E. O. Marks and Mr. N. Jack. These were amplified by the President.

Mr. V. Grenning, Director of State Forests gave a most interesting and informative address on "Forestry" and illustrated his remarks with a number of beautiful and instructive lantern slides.

Mr. G. H. Barker exhibited orchids and moss and Mr. K. Jackson showed a number of aboriginal weapons that had recently been presented to the Queensland Museum.

EVENING MEETING, MONDAY, 19th JUNE, 1939.—The President, Mr. G. L. Jackson, occupied the chair and there were about 200 members and friends present.

Mr. L. W. Gander of Toowoomba and Mr. J. A. Gesty of Binna Burra were elected Country Members.

The principal business of the evening was the screening by Mr. Tom Marshall of a coloured cinema film showing the natural history of the Great Barrier Reefs in many beautiful and varied aspects.

EVENING MEETING, MONDAY, 17th JULY, 1939.

—The President, Mr. G. L. Jackson, was in the chair and about twenty-three members were present.

The President and Mr. J. E. Young reported on the excursion to Mount Tamborine when, among other points of interest, a visit was made to the Macrozamia Reserve or as it is now called Franklin Park.

Reports were also received of the excursions to Closeburn and to Kalinga Park, where a coal seam was inspected,

Mr. W. F. Bevington, late Inspector of Schools and now Lecturer associated with the Queensland Museum, gave a most entertaining and instructive address on The Use of Natural History in Education.

Mr. K. Jackson exhibited land shells collected on Tamborine Mountain.

THE GRASSES AND GRASSLANDS OF THE PETRIE DISTRICT.

By S. T. Blake, M.Sc.

FOREWORD.

The following is abridged from one of the theses prepared in 1933 as part of the requirements for the Honours Course in Botany in the University of Queensland. Several years' residence in the district formed the basis of the work. Very little alteration to the main body of the original paper has been made except where further study of some species has required a few nomenclatural changes. Specimens of the majority of the grasses mentioned had been determined by Mr. C. E. Hubbard, the well-known authority on grasses, during his sojourn in Queensland, while a few have been determined since his return to Kew. Unfortunately the species of *Digitaria* are still not thoroughly understood, and it is not yet possible to be as precise as one could wish.

GENERAL CONSIDERATION.

The area studied comprises an area of about 15 square miles, situated 16-18 miles north of Brisbane, which it resembles climatically. The average annual rainfall is 48.06 inches, most of which falls in January and February. The driest month is August with an average of 1.55 inches. No temperature figures are available, but those for Brisbane may be taken as approximately correct.

Average Annual Temperature 68.9 deg. F.

Average Temperature of Hottest Month .. 77.2 deg. F.

Average Temperature of Coldest Month .. 58.5 deg. F.

GEOLOGY AND TOPOGRAPHY.

Three distinct geological series are represented in the district, and they all give rise to acid soils. The two lower series, the Greenstone Series and the Bunya Phyllite Series, are members of the Palaeozoic Brisbane Schists which are widely distributed in south-east Queensland. The third

series, the Petrie Series, is a Tertiary deposit of comparatively small extent, but which covers a large part of the area under consideration. The distinction between these formations is important, primarily from a topographical viewpoint. The area is almost entirely below the 200ft. contour line, the highest ground is in the north and north-west and becomes gradually lower to the east and south-east, where it falls almost to sea level. The Schists are confined to the higher north and north-west and are much folded, giving a series of frequently rather steep and narrow ridges with usually narrow valleys between. The sides of the ridges are washed out by numerous waterways, so that this part of the area presents a very broken, though by no means rugged, topography. The result of this is that there is a large surface run-off, and except in the lower parts of the valleys the soil is shallow. In the Bunya Phyllites part of the area, except in the valleys, the ground surface usually consists of a layer of white quartz pebbles of various sizes.

The Petrie Series on the other hand is characterised by gently sloping or undulating country with little surface run-off, deeper, generally sandy soil, which in depressions is frequently waterlogged during the wetter parts of the year. Local variations of soil-type however, are common. The Petrie Series is anything but homogeneous petrologically, varying from pale-coloured fine-grained sandstone to conglomerates. These conglomerates are frequently ferruginous, and the pebbles derived from them often cover the surface of the ground. The ferruginous types are chiefly developed in the south-west. Small patches of red loams occur sporadically in the east. One very important feature of the area is the presence of the North Pine River and its two tributaries, Sidling Creek and One Mile Creek. The presence of these streams is responsible for profound local variations in the soil and the accompanying flora. The river is bordered by alluvial flats, sometimes rather wide, sometimes almost obliterated by the proximity of the bordering "flood-banks." Many of these flats are more or less covered with gravel, often very coarse ("Gravel Pits"). This gravel is deposited by the periodic floods to which the river is subject. An especially severe flood, such as occurred in February, 1931, may alter the position of these beds, sometimes scouring the pits almost completely and depositing the gravel elsewhere. During the above-mentioned flood many farms were completely ruined by such a deposition of gravel. In the lower part of its course

the river runs through the Petrie Series and becomes very slow. The tide limit extends into the Greenstones area, but affects the vegetation only in the flat Petrie Series area. One Mile Creek and Sidling Creek are much smaller streams, often little more than a chain of waterholes during the dry season. Alluvial flats of small extent occur along Sidling Creek; the flood banks are lower, and the second terrace is therefore more affected by the presence of the stream. The One Mile Creek flows for the most part through the Petrie Series. Its flood banks are low but steep, and there is usually a stretch of shingle between them and the water's edge.

VEGETATION—GENERAL CHARACTERS.

Originally the greater part of the area was covered by open forest composed chiefly of *Eucalyptus* spp. *Angophora subvelutina* was scattered among the Eucalypts on the schists, its place being taken by the allied *Angophora costata* on the Petrie Series. In the damper depressions *Tristania suaveolens* was common, and in still lower and damper regions in the Petrie Series area *Melaleuca viridiflora* formed nearly pure communities. In the Petries also *Acacia Cunninghamii* and *Casuarina torulosa* were frequently sub-dominants, but were rarer on the schists. A sparse undergrowth of shrubs or small trees was probably present. This is now absent on the Greenstones. On the Phyllites it comprises such plants as *Jacksonia scoparia*, *Daviesia ulicina* var. *angustifolia*, *Leucopogon juniperinus*, *Acrotriche aggregata* and *Lissanthe strigosa*. On the Petries a similar suite appears in some places in the south-west. In the east and south-east the chief members are *Jacksonia scoparia* with *Persoonia cornifolia*.

Along the banks and adjacent flats of the larger streams rain forest occurred. Swampy areas occur particularly in the east. They are rare on the schists.

In the extreme east and south-east the North Pine River is bordered by mangrove swamps with salt meadow behind. In the western and south-western part very little of the original vegetation is now left. Almost all the rain forest has disappeared except for a narrow fringe of trees on the stream banks and an occasional tree such as Red Cedar (*Cedrela australis*) or *Aphananthe philippinensis* on the river flats. The open forest has been more or less completely cleared, giving parkland or grassland pseudoclimaxes. A small area on the Bunya Phyllites is least altered.

In the east clearing has not gone on to the same extent and it is possible to guess at the composition of the original vegetation with a fair degree of certainty. Fires have, however, affected the grass vegetation considerably.

Lantana (*Lantana Camara*) is fairly common in the district and its presence causes much local modification of the ground vegetation.

Mixed with the grasses throughout the area are several small perennial herbs and undershrubs. Characteristic of the Greenstones particularly is *Pimelea linifolia*. Several leguminous trailers and twiners occur such as *Glycine clandestina*, *G. tabacina*, *Desmodium varians*, and where extensive clearing has not taken place, *Hardenbergia monophylla*, *Desmodium rhytidophyllum* and *Flemingia parviflora* occur.

THE GRASSES.

Over 100 species of grasses have been recorded for the district. As might be expected many of these are only occasionally met with, though a considerable majority are comparatively common. It is impossible to deal with all these in the present paper, and while the most outstanding species are dealt with pretty fully, many have had to be arbitrarily omitted. A few of the rarer species which exhibit certain points of interest will, however, be considered.

It is proposed to treat the grasses in the light of the present pseudo-climax conditions. From this standpoint it is much simpler to follow the effect of human interference and at the same time it makes it possible to treat the economical side of the problem more directly.

The first effect of clearing is the appearance of *Digitaria didactyla* (Blue Couch), which on completely cleared land, except in very damp situations, forms an almost complete cover up to an inch or more in thickness. In the damper stations it is gradually replaced by *Paspalum dilatatum*. Towards the tops of the ridges in the Bunya Phyllites area, *Digitaria* is to a large extent replaced by *Eremochloa bimaculata*. On gravelly places near the river, and to a lesser extent on more or less stony places near the tops of the ridges, *Cynodon dactylon* (Indian Couch) is the dominant species, but as humus accumulates, it tends to be replaced by the *Digitaria*.

Both Blue Couch and Indian Couch are low creeping grasses with a considerable amount of leaf, but they never form very thick carpets. Both are good fodder grasses, but the *Cynodon* is much the better of the two.

Associated with the *Digitaria* as co-dominant is

Bothriochloa decipiens (Pitted Blue Grass). This is a somewhat tufted grass, shortly leafy at the base with flowering culms up to 2ft. high and a narrow silver-grey inflorescence. It is considered a distinctly inferior pasture grass. It tends to disappear on open hill tops in Phyllites country, leaving either Blue Couch alone or being replaced by *Eremochloa bimaculata*. The latter has a dense shortly leafy base with oblique or erect flowering culms up to about twelve inches, bearing a single curved spike. From its possession of a short horizontal rhizome it tends to form continuous patches, its characteristic olive-green colour contrasting strongly with the more or less glaucous hue of the *Digitaria*. It is really a climax species which has persisted after the removal of the original forest.

Paspalum dilatatum, which replaces Blue Couch in the lower part of the valleys, has received much attention as a fodder grass. In its normal state this American species forms distinct densely leafy tussocks and is then of great value. Unfortunately, the pasture soon tends to become rootbound with a gradual diminution of leaf growth. Finally it forms a dense continuous sod with very little leaf, which not only is of little value in itself, but which effectually prevents any other species from attaining a foothold. It is, however, frequently associated with the tussocky grasses *Sporobolus capensis* (rat-tail grass), and *Pennisetum alopecuroides* (fox-tail grass). These two species attain 3ft. in height, but their leaves are too rigid to be of much grazing value.

Many other grasses occur in the *Digitaria-Bothriochloa* associates. Most prominent among these is *Sporobolus elongatus* (a rat-tail grass) which frequently assumes the importance of a co-dominant. It is a somewhat tufted leafy grass with a long narrow leaden-grey spike-like inflorescence.

The genus *Eragrostis* is a valuable component and is frequently common. The three species present are *E. elongata*, *E. Brownii*, and *E. leptostachya*. They are leafy grasses, the culms rarely reaching a foot in height. *E. leptostachya* is a slender species, and usually occurs only where trees are present. It is more shade-demanding than the others.

On the mid-slopes of the hills *Hyparrhenia filipendula* is frequently prominent and occasionally dominant over small areas. It forms small or fairly large tufts, the culms are usually much branched and the plant leafy throughout. Although nothing is definitely known as to its

economic value, it appears to be quite a good fodder grass at least in the fairly young state.

Occasionally on hillsides tussocks of a spear grass (*Aristida ramosa*) occur. This is a much-branched wiry grass with very little leaf and is quite useless for fodder. Where clearing has not been complete and the country assumes a parkland appearance other grasses occur. *Cymbopogon refractus* (barb-wire grass) forms here comparatively small tufts, the culms attaining 2-3ft. *Microlaena stipoides* (meadow rice-grass) is rather common with its usually small dark green leafy tufts and narrow nodding panicle. *Panicum effusum* with its widely spreading panicle, and *Chrysopogon sylvaticus* with its narrower rich purple panicle form leafy tufts which, with the *Microlaena* are readily devoured by stock. Several species of *Digitaria*, some of them undetermined, appear. One of these, *D. longiflora*, is exceedingly like *D. didactyla* in habit, but the flowering culm is more slender and sparsely hairy, and the spikelets are smaller. Another (*D. tenuissima*) with a somewhat similar habit has shorter, broader, hairy leaves and a more divided inflorescence. The others are densely tufted grasses, leafy at the base, with a copious inflorescence. The flowering culms are usually 1-2ft. high, though *D. parviflora* attains 5ft. at times. Among these species *D. didactyla* tends to thin out.

This generally represents the nearest approach to a true climax formation on the Greenstones. On the Phyllites *Digitaria* is poorly represented. As the trees thicken the *Digitaria didactyla*-*Eremochloa* associes is gradually replaced by the climax associations. The cover thins out and the ridges are dominated by scattered tufts of *Arundinella nepalensis* and *Aristida* spp. and *Eremochloa bimaculata*. The *Arundinella* forms dense tufts of 2-3ft. or more in height of stout, wiry, rarely branched culms, and comparatively few, short, rigid leaves. The species of *Aristida* are usually 1½-2½ft. high, less densely tufted than the *Arundinella*, the culms usually more or less oblique but rigid, and the leaves usually narrower. The chief species are *A. glumaris*, *A. vagans* and *A. queenslandica*.

Eremochloa bimaculata occurs in scattered patches between the other dominants. There is nowhere a continuous ground cover.

Another grass which is generally associated with these species is *Entolasia stricta*. It forms rather loose almost leafless tufts, the culms are wiry and much branched, usually more or less decumbent, and rarely a foot high.

Although scarcely a dominant, it frequently forms societies of some extent.

In the damper places *Chrysopogon sylvaticus* appears, together with *Panicum fulgidum*, a rather small species about 1ft. high. In some places blady-grass (*Imperata cylindrica* var. *Koenigii*) is dominant over comparatively large areas, due chiefly to continual firing.

The climax communities on the Petrie Series are very different. On the higher ground to the north-east and south-west of the area the community is chiefly a *Cymbopogon-Digitaria-Eremochloa* association. The *Cymbopogon* (*C. refractus*) forms a denser and larger tuft than when it occurs on the Greenstones. Sometimes it forms small consociations. The *Eremochloa* (*E. bimaculata*) may likewise occur as scattered tufts or as pure consociations. The spp. of *Digitaria* (chiefly *D. orbata* and an allied undescribed species) form small leafy tufts with flowering culms 2-3ft. high. They usually occur scattered between *Cymbopogon* and the *Eremochloa*, or forming with the latter a fairly close ground cover. The other commonly occurring grasses are *Arundinella nepalensis*, *Eragrostis Brownii*, *E. leptostachya*, *Panicum fulgidum*, *P. effusum*, and *Imperata cylindrica* var. *Koenigii*. Occasionally one of these may become dominant over small areas, as for example *Arundinella*.

In the east and south-east, as the country becomes lower and *Eucalyptus micrantha* (scribbly gum) becomes prominent in the forest make-up, a very different grass population appears. The dominants are *Aristida* spp. and *Panicum fulgidum*. Two species of *Aristida* occur, both restricted to this association. They are *A. Benthamii*, and *A. intricata**. The latter is most characteristic. It is a rather densely tufted, shallowly rooted species, with numerous very slender nearly prostrate leaves and culms, the latter being unbranched and attaining 3 feet in length. This species from its habit impart a characteristic appearance to the forest floor, the grass appearing as though lying in swathes.

A. Benthamii is a slender tufted suberect grass up to 3 feet or more with a drooping panicle of numerous small purple spikelets. It is less common than the other species and is frequently absent. *Panicum effusum* occurs chiefly in the somewhat drier areas. It is not so prominent as the spp. of *Aristida*.

Melaleuca (tea-tree) swamps are common in this

**Aristida intricata*—S. T. Blake in Proc. Roy. Soc. Queensl. li. ined.

part of the area, and here the chief grasses are *Arundinella nepalensis*, *Paspalum orbiculare*, *Hemarthria compressa*, *Ischaemum australe*, and *Sacciolepis indica*. The *Arundinella* has a very different appearance from that which it assumes on the Phyllites. The tufts may be as dense, but the culms are much more slender with longer internodes, more or less branched, and often more or less scandent, while the leaves are much narrower and the inflorescence more contracted. *Paspalum orbiculare*, *Hemarthria compressa*, and *Ischaemum australe* are the characteristic grasses of these swamps, though only the *Hemarthria* is confined to them. This species is a branching creeping or sub-scandent grass with narrow, rather rigid, spreading leaves; it frequently forms tangled masses. The inflorescence is curved and spikelike. The *Paspalum* forms densely leafy tufts with oblique, rigid, flowering culms. The inflorescence is frequently infested with *Cerebella paspali* C. et M. *Ischaemum australe* is a somewhat tufted more or less erect, occasionally branched plant with rather long and broad leaves. The culms attain 2 feet. Both it and the *Paspalum* occur in damp places elsewhere.

Between the typical *Aristida* association and the typical swamp, an ecotone frequently occurs with a small species of *Eriachne* predominating.

There is a complete gradation between the *Aristida* association and the *Cymbopogon-Digitalaria* association. *Themeda australis* (kangaroo grass) is not uncommon, and blady grass shows where fairly recent burning has occurred.

In the extreme east and south-east the North Pine River is lined with salt meadows of considerable extent. The sole grass and frequently the sole plant of the meadow is *Sporobolus virginicus* var. *minor*. This plant, commonly known as salt-water couch, forms a dense resilient turf 1-2 inches thick, and has an excellent reputation as a fodder. In this district this grass is practically confined to the salt meadow, but elsewhere it has been observed thriving well away from brackish water. Its deep, extensively creep and much branched rhizomes anchor the plant so firmly that the aerial branches are frequently torn up by stock whilst grazing.

This completes the generalised account of the area, but a few special features have yet to be considered.

OPEN SWAMPS.

Open swampy tracts are rare, but a few small ones do occur. The characteristic species is water couch, *Paspalum distichum*. This is a bright green, extensively creeping grass rarely more than 2-3 inches high. Quite frequently it grows floating on water. *Panicum Buncei* and *Pseudoraphis squarrosa* are very similar in appearance and habit. They only appear when free water is present. *Lyceria hexandra*, a rather tall though diffuse grass up to 6 feet long, sometimes occurs. Where free water is not present, *Sacciolepis indica*, *Paspalum orbiculare*, *Ischaemum australe*, *Paspalum dilatatum* and occasionally *Cynodon dactylon* occur. The *Sacciolepis* is a scarcely tufted slender grass of from 2-20 inches high with a narrow leaden grey spike-like inflorescence. These areas are bordered by a *Paspalum dilatatum*-*Digitaria didactyla* associates which then passes into the ordinary *Digitaria*, etc., community.

STREAM BANKS.

Along the banks of the larger water-courses (North Pine River, Sidling Creek and One Mile Creek), a characteristic suite of grasses occurs. The two factors controlling the presence of these species are moisture and shade. Where both these factors are at a maximum, *Ottochloa gracillima* occurs. This is a creeping grass with narrow lanceolate shining green leaves, ascending flowering culms and a small panicle. It does not leave the stream banks. With it occurs *Oplismenus aemulus*, a plant of similar habit with rather broader, usually distinctly hairy, dull green leaves and a slightly different inflorescence. This species is by no means confined to stream banks, but is common everywhere where suitable conditions prevail. Beneath a lantana bush is a favourite station. *Entolasia marginata* resembles the *Ottochloa* more than the *Oplismenus*. It enters the open forest but is rare.

In less densely shaded places *Microlaena stipoides* and *Eriochloa procera* are fairly common. They also extend into the open forest. The *Eriochloa* has pale green leaves, tufted at the base with erect or diffuse culms. *Echinopogon nutans* and *E. ovatus* are grasses of similar habitat but are rarer. *E. ovatus* causes staggers in horses.

A characteristic grass behind the Fringing Forest, and a species met with in most damp more or less shady places

is *Sporobolus diander*. This species forms dense narrow-leaved tufts of considerable size with culms up to 3.4 feet in height. Moisture appears to be the more important factor in its distribution.

Where the Fringing Forest has been removed, and on the occasional mudbanks? *Echinochloa crusgalli*, *E. colona* and *E. Walteri*? occur. The two first-mentioned are comparatively small plants, *E. crus-galli* attaining 2 feet, while *E. colona* is usually less than 1 foot. They have rather succulent stems and broad leaves with awnless, pale-coloured spikelets. *E. Walteri*? on the other hand is a much larger plant. It is much more erect, more densely tufted, with a large dense panicle rendered conspicuous by the numerous long purple awns. All these species are readily eaten by stock. *E. colona* occasionally appears as a weed of cultivation. The grasses on the bank in the more open parts are chiefly water couch (*Paspalum distichum*) and Indian couch (*Cynodon dactylon*) with Blue Couch (*Digitaria didactyla*) just behind. On the gravel pits the first grasses to appear are *Cynodon*, and the annuals *Echinochloa colona*, *Setaria glauca* and the closely allied *S. pallidifusca*. As soil is deposited there is a tendency for the *Cynodon* to be driven out by *Digitaria didactyla*.

Two very interesting grasses along the North Pine River are *Vetiveria filipes* and *Setaria geniculata*. The former is a densely tufted grass with a leafy base and flowering culms up to 3 feet high bearing a somewhat contracted purple panicle. It frequently occurs among rocks, and is never found far from the water's edge. The *Setaria* also has a tufted leafy base, but it has a distinct horizontal rhizome, and a green spike-like bristly inflorescence. This grass has been found a short distance from the river.

RAILWAY ENCLOSURES.

In railway enclosures a characteristic but very varied grass vegetation occurs. The commonest species are *Rhynchelytrum repens* (red Natal grass), *Themeda australis* (kangaroo grass), *Alloteropsis semialata* (cockatoo grass), *Aristida queenslandica* and *A. vagans* (spear grasses), *Imperata cylindrica* var. *Koenigii* (blady grass), and *Capillipedium parviflorum* (scented golden beard). In general it may be said that the less the soil has been disturbed by banking or excavation, the greater the tendency for *Themeda* to dominate the vegetation, and the greater the amount of disturbance, the commoner *Capillipedium* becomes. *Sorghum verticilliflorum*, which is very common nearer Brisbane, is only known in one small patch,

The *Themeda* forms dense long-leaved tufts up to 18 inches high, the graceful flowering culms attaining 4 feet. The inflorescence is narrow, lax, somewhat nodding, and ultimately brown. The *Capillipedium* is less densely tufted with rather broader leaves and an erect ovoid reddish or purplish panicle which emits a fragrant odour when rubbed. It is commonest on the lower embankments.

At the bottom of the higher embankments the ground is generally appreciably damp and *Alloteropsis* and *Imperata* become prominent. The *Alloteropsis* is prominent from its short leafy base, long slender culms up to 3 feet, with 2-3 stout reddish brown digitate spikes.

Another grass which, at certain seasons immediately after rain, becomes very noticeable is the ephemeral *Agrostis avenacea* (*Calamagrostis filiformis*). The extremely large spreading panicle with its innumerable, minute, ultimately white spikelets sometimes conceals all the smaller grasses associated with it. *Rhynchelytrum* with its reddish panicle is a rambling grass restricted to the sides of embankments.

Many other species occur, some such as *Eragrostis* spp. sporadically throughout, others under certain conditions. When the bottom of the embankment is very damp *Paspalum orbiculare* and certain *Cyperaceae* predominate. On the tops of cuttings *Eremochloa bimaculata* and *Entolasia stricta* advance from the surrounding country, but never displace *Themeda*. This occurrence on undisturbed areas of *Themeda* is interesting and it is possible that originally it formed an important element in the grass population of the district, at least in certain areas. At present it is almost, though not entirely, restricted to railway enclosures.

WEEDS OF CULTIVATION.

There are several species which occur only near habitations or where cultivation has taken place. Excepting *Eleusine indica* (cock-spur grass) and *Sorghum halepense* (Johnson grass) they are all annuals. The commonest and most obnoxious is *Digitaria adscendens*, the well-known summer grass. This more or less creeping grass quickly over-runs any bare spaces in farm or garden. *Eragrostis parviflora* appears after rain at almost any time of the year. It lasts only a few months, but makes good hay. *Setaria glauca* (wild millet, wild panicle) frequently appears in farms and *Brachiaria miliiformis* at the edges. The *Setaria* may occur as solitary culms or small tufts up to 18 inches high. It is conspicuous by its golden brown

or tawny, bristly, spike-like inflorescence. It is probably of as much value as the cultivated millet or "panicum" (*Setaria italica*), but is a much smaller plant. *Eragrostis Cilianensis*, known as "stink-grass" on account of its strong rather foetid odour, is common in places.

Johnson grass occurs in a few places only, but where it does occur, it is a serious pest. It is a tall stout grass up to 6 feet high, with long stout branching rhizomes which make it difficult to eradicate.

There are two grasses which are commoner near buildings than in cultivation plots. One is the annual prairie grass, *Bromus unioloides*, which appears in spring and early summer; the other is *Eleusine indica* (cockspur grass) a more or less prostrate or suberect bright shining green perennial, which also appears in cultivation and by roadsides.

The annual winter grass, *Poa annua*, so common in Brisbane, has scarcely been observed in this district.

ROADSIDES.

Along roadsides the commonest species are *Digitaria didactyla*, *Cynodon dactylon*, *Sporobolus capensis*, *S. diander*, *Aristida glumaris*, *A. vagans*, and in the water-tables, *Eragrostis pilosa*.

GENERAL DISTRIBUTION OF SOME OF THE SPECIES.

Some of the genera will now be considered in a general way with regard to their distribution in the district. The genus *Aristida* will be considered first. It is represented by eight undoubted species and one doubtful form, namely:—*A. Bentharii* Henr., *A. calycina*, R.Br., *A. glumaris* Henr., *A. queenslandica* Henr., *A. ramosa* R.Br., *A. vagans* R.Br., *A. gracilipes* Henr., and *A. intricata* S.T., Blake (ined.) the doubtful form is probably merely a variety or habitat form of *A. ramosa*. All belong to the section *Chaetaria*, and are densely tufted perennials with tough wiry stems and more or less involute rather rigid leaves. Three distinct habit-types may be distinguished:—

- (1) The *glumaris* type comprising *A. glumaris*, *A. queenslandica*, *A. vagans* and *A. Bentharii*. These species are erect, scarcely branched, with a divaricate, usually erect panicle (except *A. Bentharii*, where it is more or less nodding) with small to medium sized glumes, lemmas, and awns,

- (2) The *ramosa* type, comprising *A. calycina*, *A. ramosa*, *A. gracilipes*, and the doubtful form mentioned above. These species are more or less erect, much branched, the leaves smaller than in the preceding type, the panicle contracted and usually spikeform. Glumes, lemmas, and awns are intermediate. The group is confined to the schists.
- (3) *A. intricata*. This is a very distinct species with entirely unbranched very lax culms, numerous rather long and very narrow basal leaves, and a narrow contracted panicle. The awns are long, with a long twisted column below the trifurcation, and the lemma has a rather long very sharp callus of great penetrative power. The middle branch of the awn is stout and curved, and at maturity the curved awns of several fruiting lemmas become entangled with one another so that the grain is distributed in groups. This species are much more shallowly rooted than those of the preceding groups. It is in this district confined to the deep sandy soil in the extreme east.

The *glumaris* group is most widely spread. *A. Benthami* is confined to the Petrie series. *A. glumaris* and *A. vagans* are dominant species in the typical phyllites grass community, and are common roadside species. *A. queenslandica* is more prominent on the upper part of railway embankments and the sides of cuttings. Some forms of these species resemble one another very closely in the field, but *A. queenslandica* can always be distinguished by its woolly lower internodes and *A. vagans* by its relatively short awns and glumes. The latter grass is very variable in stature and to some extent in habit, often spreading and more or less branched, particularly in the smaller forms. It is the commonest species of all.

A. ramosa occurs scattered over the schists area. The form allied to it mentioned above occurs in partially cleared greenstone country. *A. gracilipes* is an extremely slender plant with drooping inflorescence confined to the phyllites. *A. calycina* appears to be rare in the district.

None of the species except possibly the young growth of *intricata* has any real grazing value.

The genus *Chloris* has scarcely been mentioned in the general consideration of the grasslands. It is represented by six species:—*Ch. divaricata* R.Br., *Ch. gayana* Kunth,

Ch. truncata B.R., *Ch. unispicea* F. Muell., *Ch. sclerantha* Lindl. and *Ch. ventricosa* R.Br. not one of these grasses is common, but collectively they merit notice, particularly as all are valuable fodder grasses.

Chloris gayana, the well-known Rhodes grass, is an introduced species which has not yet succeeded in establishing itself. From its long creeping culms and densely leafy habit it would probably be successful against all competitors except possibly blue couch, but it would have to be sown on freshly burnt land.

Ch. divaricata and *Ch. truncata* (star grasses) are the commonest species. They occur scattered over the greenstone area occasionally forming small societies, and appear to be spreading. These species lack the vigorous stolons of Rhodes grass, and have shorter and narrower leaves. The culms rarely attain 9 inches, bearing about half a dozen digitate, divariccate rather rigid racemes. In the west and north-west of Queensland they are much prized grasses, and they may be only recent arrivals in the district.

Chloris sclerantha resembles Rhodes grass in habit and leaf character, but is less robust. It is probably equally valuable, but is confined to a small damp area near Sidling Creek. *Ch. ventricosa* is a much smaller and more slender plant, which occurs here and there on the greenstones, chiefly in rather damp and shady situations.

Chloris unispicea is only known from one roadside habitat and is most probably a waif.

Dichelachne micrantha Dom. is a fairly common grass on the greenstones. It is a rather leafy grass which responds quickly to the least shower of rain.

Stepotaphrum secundatum, buffalo grass, has appeared in several places where it is slowly suppressing blue couch.

ECONOMIC CONSIDERATIONS.

One of the chief industries in the district is dairying. It cannot be said that the pastures are very suitable for this industry under present methods of procedure. The carrying capacity is low and over-stocking is common. The blue couch is not a bad grass, but is never allowed to produce much leaf. The other dominants are, as a rule, not very suitable grasses, though many of less importance ecologically are fairly good grasses. If a system of rotation were introduced it might be possible to encourage the growth of such genera as *Eragrostis*, *Chloris*, *Dichanthium* and

Hyparrhenia, with beneficial results. At the gardens of the Acclimatisation Society at Lawnton (Petrie Series and Greenstones) an experimental artificial pasture of Perennial Rye Grass (*Lolium perenne*) and various clovers has been laid down, but though only a few years old, and with every attention afforded it, the Perennial Rye is being rapidly replaced by other grasses.

SUMMARY.

The area considered has a sub-tropical climate characterised by summer heat and winter drought. Three distinct geological formations occur, namely, Greenstone Series, Bunya Phyllites Series and Petrie Series. Associated with the variation of geological characters there is a variation in topography and soil types. It was found that vegetation was correlated with topographical features and these again with geological features. The vegetation climax is chiefly open forest, but owing to settlement parkland and grassland pseudo-climaxes are the rule.

The climax grass community on the higher Greenstone area is unknown, but *Cymbopogon refractus* and *Digitaria* spp. were probably common.

On the Bunya Phyllites the climax is an *Arundinella nepalensis*—*Aristida* spp.—*Eremochloa bimaeculta* association.

On the Petrie Series there are three distinct associations. On the higher ground the climax is a *Cymbopogon refractus*—*Digitaria* spp.—*Eremochloa bimaeculta* association. On the lower ground to the east it is an *Aristida* spp.—*Panicum effusum* association. In the extreme east Salt Meadow dominated by *Sporobolus virginicus* var. *minor* occurs.

Various modifications of these climax types are induced by natural features, namely:—

Tea-tree swamps with *Heemarthria compressa* as the grass indicator and *Arundinella nepalensis*, *Paspalum orbiculare*, *Sacciolepis indica* and *Ischaemum australe* as associated species.

Stream banks with shade-demanding species, *Ottlochloa gracillima* being the indicator.

Low-lying damp, but not swampy places with *Sporobolus diander* as the indicator species.

The present pseudo-climax vegetation is dominated by *Digitaria didactyla* associated with *Bothriochloa decipiens* on the higher ground and *Paspalum dilatatum* on the lower damp places. In the very damp (not wet) places *Paspalum*

dilatatum entirely replaces the *Digitaria* and is then usually associated with *Pennisetum alopecuroides* and *Sporobolus capensis*. In distinctly swampy places *Paspalum distichum* is the dominant species.

The pastures have suffered considerably from overgrazing.

THE FOREST TREES BETWEEN FLAGGY ROCK AND SARINA, NORTH QUEENSLAND.

By W. D. Francis (Department of Agriculture and Stock,
Brisbane.)

(Flaggy Rock is situated on the main North Coast Railway Line, 136 miles north of Rockhampton. Sarina is on the same line, 43 miles north of Flaggy Rock. Some years ago the author had the opportunity of observing the forests of this area in some detail.—Editor.)

(a) TREES OF THE FLATS AND HILLS.

Eucalypts and Tea Trees are the dominant species throughout. Therefore the whole section can be conveniently embraced by the term Eucalyptus-Melaleuca association. Another genus of trees, *Tristania*, which includes the Swamp Mahogany, is also frequently represented. The Eucalypts, Tea Trees and Swamp Mahogany occur in pure or mixed stands. There are many thousands of acres of flats and gradual slopes covered with Tea Trees unmixed with other forest species. Three varieties of Tea Trees are represented in the coastal portion. *Melaleuca Leucadendron* var. *Cunninghamii* is the very common one. The White Tea Tree, *Melaleuca Leucadendron* var. *minor* is only seen in the southernmost part from Carmila southwards. It is sparsely scattered throughout the more abundant *Cunninghamii*. The Drooping Tea Tree, *Melaleuca Leucadendron* var. *mimosoides* is a larger variety than the other two. It has pendent branchlets and foliage and is confined to the banks of watercourses and water holes. The very common variety *Cunninghamii* is a small tree and in this area varies in height from about 20—40 feet.

There are a number of Eucalypts in the coastal portion: Poplar Gum (*Eucalyptus alba*), Bloodwood (*E. corymbosa*), Blue Gum (*E. tereticornis*), Ironbark (*E. drepanophylla*), Narrow-leaved Ironbark (*E. crebra*), Silver-leaved Ironbark (*E. melanophloia*), Moreton Bay Ash (*E. tessellaris*), Cabbage Gum (*E. papuana*) and Stringybark (*E. acuminoides*). Other large forest trees in

the portion are Swamp Mahogany (*Tristania suaveolens*) which is very frequent and Scrub Box (*Tristania conferta*). The Blue Gum, Poplar Gum, Ironbark, and Swamp Mahogany are sometimes found in pure stands. On flats pure stands of Blue Gum, Poplar Gum, and Swamp Mahogany often occur. Ironbark in pure stands is mostly seen on ridges. Mixed communities of these forest trees are much more general. Swamp Mahogany and Blue Gum often occur together on flats and slopes. Poplar Gum and Bloodwood occur on flats and hillsides alike. Cabbage Gum is sparsely scattered throughout the forests on flats and rises. Ironbark and Narrow-leaved Ironbark grow on ridges mixed with Bloodwood and Poplar Gum. The Stringybark, Scrub Box, and Silver-leaved Ironbark are the forest trees which show the greatest degree of selectiveness in the soil in which they grow. The Stringybark and Scrub Box were always seen on dry, highly siliceous soils in association with Grass Tree (*Xanthorrhoea media*). They are not very common trees in the area and were observed on the Mt. Funnell Range and in the Southern part of the coastal portion between West Hill and Flaggy Rock. The Scrub Box is commonly found in Southern parts of the State on the edges of rain forests. In the Sarina—Flaggy Rock district, the species has a very different environment. The Silver-leaved Ironbark is also found in dry siliceous soils or in rocky situations; it is also an indication of a fairly low rainfall. It is not very common in the coastal portion, and was seen in the Southern half towards and on Mt. Funnell Range and in the rocky country between Carmila and Flaggy Rock, where it was most plentiful. It is interesting to note that the part between Carmila and Flaggy Rock has the lowest rainfall (47 inches) of the coastal portion.

The Eucalypts and the Swamp Mahogany are intermixed with the Tea Tree (*Melaleuca Leucadendron* var. *Cunninghamii*) on flats and gradual slopes. The Poplar Gum, a tropical species, is the most prevalent Eucalypt in the coastal portion. Bloodwood, Blue Gum and Ironbark are also frequent. Apart from the generalisations given above, it is difficult or impossible to place limits on the local distribution of individual species of Eucalypts or the other forest constituents. It is evident that most of these species possess in a high degree the power of adapting themselves to different kinds of soil.

Other constituents of the Flat and Hill Associations

are: Swizzle (*Timonius Rumphii*), "Acacia" (*Albizzia procera*), "Apple" (*Careya australis*), Serew Pine (*Pandanus* sp.), Black Wattle (*Acacia Solandri*), Mackay Cedar (*Albizzia Toona*), Grass Tree (*Xanthorrhoea media*) "Zamia" (*Cycas media*), Forest Oak (*Casuarina suberosa*), Honeysuckle (*Banksia integrifolia*) and *Acacia flavescens*.

Swizzle is generally a small tree, but sometimes it grows to a fairly large size up to 18in. in stem diameter and 60 feet in height. It is fairly common and is generally distributed throughout the area with the exception of the damp Tea Tree flats.

"Acacia" is fairly generally distributed, but avoids the damp Tea Tree flats, and the highly siliceous country occupied by grass tree. There is very little of it in the country from Mt. Christian southward to Flaggy Rock, except on and near the creek flats.

The Screw Pine is generally distributed throughout the area on the damp flats and gradual slopes.

Apple (*Careya australis*), which is not related to the "Apple Tree" of southern forests, is generally distributed and is a fairly common tree.

The Black Wattle (*Acacia Solandri*) is rather sparsely distributed, but ranges over the whole portion.

The Mackay Cedar (*Albizzia Toona*), although not frequent, is seen here and there throughout the portion with the exception of the damp tea tree flats. This species is obviously highly adaptable to various environments as it is one of the largest and most luxuriant of the rain-forest trees.

Grass Tree occurs in patches on highly siliceous soils. The chief patches of Grass Tree occur in the following parts of the portion: Grass Tree gold field (N.E. from Sarina), between Sarina and Koumala, but nearer the Sarina end (this is not a very extensive patch), on the Mt. Funnel Range, between Mt. Christian and Ubbilbie, between West Hill and Carmila, and between Carmila and Flaggy Rock. There is much more Grass Tree country in the southern part of the portion from the Mt. Funnel Range southwards than in that part of it north of Mt. Funnel Range. Stunted timber is generally associated with Grass Tree. The following species were observed in this class of country, Bloodwood, Tea Tree, Scrub Box, Poplar Gum, *Acacia flavescens*, Cabbage Gum and, at the southern end of the portion, Stringybark.

"Zamia" is very sparsely scattered throughout the

area. It is most frequent on dry, highly siliceous ridges.

Forest Oak (*Casuarina suberosa*) is not widely distributed. Patches of it occur in the grass tree country south of Mt. Christian, and an occasional tree is seen on dry ridges near the Mt. Funnel Range.

Honeysuckle (*Banksia integrifolia*) is rare in the portion, and occurs on dry hillsides.

Acacia flavescens is only found on the highly siliceous soils, and is often accompanied by Grass Tree and Scrub Box.

(b) Streamside Forests

The Streamside Associations comprise the vegetation of creek banks and their adjoining flats. Creek banks and flats, although they represent a very small proportion of the total area of the coastal portion, are very important from a qualitative standpoint. Undoubtedly this class of land has exercised a very great influence in the settlement of the area. These associations are divisible into three classes according to the extent to which rain forest and rich Eucalypt forest have been developed. The smaller streams support only a very narrow fringe of vegetation differentiated from the surrounding country. The dominant species found on the banks of the numerous small streams throughout the coastal portion are: River Oak (*Casuarina Cunninghamiana*), Creek Tea Tree (*Melaleuca Leucadendron* var. *mimosoides*), Red Bottle Brush (*Calistemon viminalis*), *Pandanus* sp. In addition to these, often a few Bangalow Palms (*Archontophoenix Cunninghamii*), Milky Pines (*Alstonia scholaris*), a Native Fig Tree (*Ficus Cunninghamii*) and Lillipillies (*Eugenia australis*) are found.

The second class of Streamside Associations consists of a narrow fringe of rain forest on the banks of the stream and beyond this fringe a flat of varying extent maintaining a good class of Eucalyptus forest in which large Blue Gums and Bloodwoods predominate. These Eucalypt flats are often cultivated. The following creeks are characterised by this type of vegetation: Marion Creek, West Hill Creek and Flaggy Rock Creek. This type of creek vegetation is developed chiefly in the southern part of the coastal portion from Mt. Funnel Range southwards. All the larger streams in this southern part are of this class, and the present cultivated areas are almost confined to the flats adjoining these streams and their tributaries. Carmila Creek is the only exception to this generalisation. It differs from the other streams in

the fairly broad band of rich rain forest on its lower flats, but it possesses the same Eucalyptus (Blue Gum Bloodwood) formation on its upper flats. The vegetation indicates that these larger streams in the southern part of the coastal portion have influenced the soil adjacent to them.

The third class of Streamside Associations is connected with the largest creeks of the coastal portion, namely Plane Creek and Carmila Creek. In both these instances the extensive flats bordering the streams and their main tributaries are cultivated. The flats adjoining Plane Creek appear to have been cultivated for some time, and the clearing of the vegetation has gone so far as to leave insufficient primeval forest to base observations upon. In the previous paragraph the existence of lower and upper flats adjacent to the main stream of Carmila Creek is mentioned and their types of vegetation outlined. In this instance vestiges of the original vegetation which remain are sufficient for observation. The rain forest on the lower flat is the heaviest and most luxuriant of the whole area reported on, in spite of the fact that the rainfall is 47 inches, which is a fairly low figure for rain forest of a luxuriant type. Possibly part of the moisture requirements of the rain forest is supplied from the stream by gravitation and capillarity. The principal trees in the rain forest of the lower Carmila flats are: Milky Pine (*Alstonia scholaris*), numerous large trees; Cluster Fig (*Ficus glomerata*); Quandong (*Elaeocarpus grandis*); Bangalow Palm. (*Archontophoenix Cunninghamii*); Native Nutmeg (*Myristica insipida*); *Pisonia Brunoniana*; Maekay Cedar (*Albizia Toona*); *Terminalia* sp.; Axe-handle Wood (*Pseudomorus Brunoniana*), *Aphananthe philippinensis*. Brown Kurrajong (*Commersonia echinata*), Musk Wood (*Marlea viticensis*), *Bosistoa sapindi-formis*. In places there are a few very large Tea Trees (*Melaleuca Leucadendron* var. *mimosoides*) overhanging the stream.

The Blue Gum and Bloodwood formation of the upper flats of Carmila Creek border on Tea Tree country. The upper flats are cultivated but are not so productive as the lower ones. In the upper reaches of Carmila Creek and its tributaries the extent of the rain forest of the lower flat is very restricted.

(c) *Foothill and Range Forests.*

In this section the vegetation of the ranges and foothills will be discussed. The ranges consist principally of

Connor's Range and its spurs. The ranges and spurs are situated chiefly in the western part of the coastal portion. The vegetation of the ranges, spurs, and foothills is very varied, but it can be classified into two groups, namely Eucalyptus forest and rain forest. These two kinds of forest occur in alternating patches of very varying sizes. Sometimes only small patches of rain forest are seen, and these are often confined to the range valleys. At other times almost the whole mountain side is covered with rain forest. It was noticed that there was very little, if any, rain forest in the ranges westward from West Hill. In this particular place the ranges seem to be low. The vegetation of the coastal portion in the vicinity of West Hill is of an open character, with very little undergrowth, and is suggestive of a partial gap in the ranges to the west.

On the foothills the Eucalyptus forest and rain forest alternate with one another. The watercourses and gullies are naturally favoured by rain forest.

The Eucalyptus forest of the foothills consists largely of Bloodwood, Swamp Mahogany (*Tristania suaveolens*), Poplar Gum (*Eucalyptus alba*), Cabbage Gum (*E. papuana*), Ironbark (*E. drepanophylla*) and Swizzle (*Timonius Rumphii*). The Eucalyptus forest of the ranges and spurs consists largely of Bloodwood (*E. corymbosa*), Ironbark (*E. drepanophylla*), and in the highly siliceous parts the following species are frequent: Grass Tree (*Xanthorrhoea media*), "Zamia" (*Cycas media*), Scrub Box (*Tristania conferta*), Stringybark (*Eucalyptus acmenoides*).

The most extensive development of rain forest in the whole area is found on the ranges and foothills. As a matter of fact the rain forest is confined to these parts with the following exceptions: the streamside vegetation and a few scattered patches of rain forest between the ridges. The area embraced by the enumerated exceptions is very small in comparison with the total area of rain forest of the ranges, spurs and foothills. A very large proportion of the rain forest of the ranges and spurs is situated upon very steep mountain sides.

The rain forest of the ranges, spurs, and foothills is not of the very heavy, luxuriant type, which grows on some of the mountain ranges of Southern Queensland, and on the Eungella Range, which is about 50 miles North-West from Sarina. Evidently there is a limiting factor in its development, probably concerned with rain-

fall or soil, or with both of these conditions. The rainfall at Koumala is 54 inches, and at Sarina 68 inches per year, while that of the Eungella Range is 65 inches per annum. It is, therefore, assumed that the limiting factor in the growth of these rain forests is connected with the soil.

The principal large trees in the rain forests are: Mackay Cedar (*Albizzia Toona*), Milky Pine (*Alstonia scholaris*), a native Fig (*Ficus Cunninghamii*), Booyong (*Tarrietia Argyrodendron*), Black Jack (*Tarrietia actinophylla*), Coondoo (*Sideroxylon Richardii*), Ribbon Wood (*Euroschinus falcatus*), *Cordia aspera*, and Cudgerree (*Flindersia Schottiana*). Among the smaller trees the following may be mentioned: Hauer (*Dissiliaria baloghoides*), Native Nutmeg (*Myristica insipida*), *Ochrosia Kilneri*, *Cryptocarya triplinervis*, *Linociera ramiflora*, Muskwood (*Marlea vitiensis* var. *lomentosa*), *Sideroxylon argenteum*, *Phaleria Neumannii*, *Randia Fitzalanii*, *Ardisia pseudojambosa*, Glossy-leaved Stinging Tree (*Laportea photiniphylla*), Broad-leaved Stinging Shrub (*Laportea moroides*), *Macaranga Tanarius*, Kamala (*Mallotus philippinensis*), Axe-handle Wood (*Pseudomorus Brunonian*), *Aphananthe philippinensis*, *Trema orientalis*, *Glochidion Ferdinandii*.

The common vines of the rain forest are wild grape vines (*Vitis* spp.) and *Flagellaria indica*.

Maekay Cedar and Milky Pine are the commonest of the large trees in the rain forest. The Maekay Cedar is a tall-stemmed typical rain forest tree in this environment, and its habit here is strongly contrasted with the one it assumes in the *Eucalyptus-Melaleuca* Association of the coastal portion. The species yields a good cabinet wood. The Stinging Tree (*Laportea photiniphylla*) is an exceedingly common tree of the rain forests.

On parts of the mountains there are groves of Bangalow Palms (*Archontophoenix Cunninghamii*). These groves are parts of rain forest areas and contain rain-forest undergrowth.

OBITUARY.

Albert Morris.

By the death of Albert Morris at Broken Hill (N.S.W.) on the 9th January of this year, we lost one of the keenest students of the botany of the interior of New South Wales, and adjacent states in this country. Morris was born at Bridgewater, South Australia on the 13th August, 1886. He arrived at Broken Hill from Thacker-

inga when he was three, and it was at Thaekeringa the accident happened that made him a cripple for life. With Dr. W. R. Macgillivray he founded the Barrier Field Naturalists' Club, and was its secretary for 19 years. He collected an herbarium of over 5000 sheets mainly devoted to the botany of the interior of Australia, and particularly rich in *Acacia*, *Eucalyptus* and *Chenopodiaceae*. The herbarium is now held by the Zinc Corporation, a public company that has done much to encourage scientific endeavour in Broken Hill and district. He was always willing to assist botanical colleagues abroad, and his specimens are frequently seen quoted in monographs dealing with Australian xerophytic families. He was very keen on the cultivation of native plants. To show the esteem in which he was held locally, it may be mentioned that the Zinc Corporation intend to name one of their parks after him. There is an avenue from his grave to the gates in the Broken Hill Cemetery, and a double memorial avenue two miles long is being planted up. It is also planned to have a drinking fountain in the main street outside the Technical College.

His wife was a very keen botanist and gardener, and most of the work at Broken Hill was a joint endeavour. It is pleasing to note that the Zinc Corporation is making it possible for her to carry on some of the work.

C. T. WHITE.

WALTER ROLLO PETRIE.

It is with very sincere regret that we have to record the death on May 27th. of Mr. Walter R. Petrie, in his sixty-sixth year.

The eldest son of Mr. Thomas Petrie, he was born in the district that now bears the family name. After receiving his education at the Ipswich Grammar School, he turned his attention to agricultural pursuits on the Blackall Range, but later joined the Sub-department of Forestry, within the Queensland Department of Lands. He was stationed at Fraser Island and at Imbil in the Mary Valley, where he was associated with extensive re-forestation schemes. After his retirement from the Public Service about eight years ago, he became interested in various horticultural experiments on his own property and was a recognised authority on the Queensland Nut (*Macadamia ternifolia*).

THE QUEENSLAND NATURALIST

JOURNAL OF THE QUEENSLAND NATURALISTS' CLUB
AND NATURE-LOVERS' LEAGUE

VOL. XI

JULY 1940

No. 4

PROCEEDINGS.

EVENING MEETING, 21st August, 1939.—The President, Mr. G. L. Jackson occupied the Chair and 46 members and visitors were present.

Reports on the excursion to Mount Coot-tha were given by Mr. S. T. Blake (Botany) and Mr. N. Jack (Birds). The principal business of the meeting was a lecture by Professor Arnold Wall on the Alpine Flora of New Zealand.

EVENING MEETING, 18th September, 1939.—The President, Mr. G. L. Jackson, occupied the Chair and 47 members were present.

A report on the excursion to Beerwah was given by Mr. J. E. Young, who spoke of the wild flower flora and the various pines in the plantations of the Queensland Forest Service.

Wild flowers from Beerwah, Caloundra, Tamborine Mountain, Albert River, Chermside and Sunnybank were tabled by various members. Native ferns, orchids and various West Australian and Queensland native plants, cultivated in Brisbane, were shown by different members. Mr. Ken Jackson exhibited a Eugarie shell, which had been used by aborigines for smoothing their spears. Other exhibits tabled were a collection of shells by Mr. G. K. Jackson and some geological specimens by Dr. E. O. Marks. Dr. D. A. Herbert and Mr. S. T. Blake spoke on the various specimens of wild flowers.

EVENING MEETING, 16th October, 1939.—The President, Mr. G. L. Jackson, occupied the Chair, and about 30 members were present.

Reports were read on the week-end excursion to Bribe Island. The principal business of the meeting was a lecture by Mr. G. H. Barker on the Birds of Leeton, N.S. Wales,

EVENING MEETING, 20th November, 1939.—The President, Mr. G. L. Jackson, occupied the Chair and 50 members were present.

Reports on the excursion to Clontarf were given by Dr. E. O. Marks (Geology), Mr. S. T. Blake (Botany), and Messrs. G. H. Barker and N. Jack (Birds). Mr. C. T. White gave a short talk on his work at the Royal Botanic Gardens, Kew, England. Several exhibits were tabled by different members.

ANNUAL MEETING, 18th February, 1940.—The President, Mr. G. L. Jackson, occupied the Chair and 40 members were present.

A report on the recent excursion to the Botanic Gardens was given, and thanks were expressed to the Curator, Mr. E. W. Bick, for showing the members round. The annual report was read by the Honorary Secretary. A report by the Librarian showed that 138 magazines and 82 books have been borrowed during the year. The financial statement showed a credit balance of £54/7/3.

Office-bearers were elected as set out on the inside cover of the present number. The incoming President, Mr. H. E. Young, then took the Chair and thanked members for his election. The retiring President delivered an address on "Leaves from a Garden Diary." The President gave notice of the proposed alteration of Rule 2 (e). This rule would then read as follows:—

"Junior members are members under 18 years of age, and shall be elected in the same manner as ordinary members, and shall pay an annual subscription of 5/-."

Mr. John Nebe was elected an honorary life member of the club.

Some photographs of Little Yabba were tabled by Miss Clarke.

EVENING MEETING, March 18th, 1940.—The President, Mr. H. E. Young, occupied the Chair and 33 members were present. Misses A. M. E. Ladewig, E. Savage, E. M. Duncan, C. S. Shackleton and Messrs. H. C. Whibley, E. F. Rick, S. F. Wright and R. N. Langdon were elected members of the Club. The Club's Excursion Secretary, Mr. G. H. Barker, explained that owing to the inclement weather it would be difficult to get the Club's gear on to the camping site and he proposed that the trip should be postponed. This was seconded and carried.

The principal business of the evening was a lecture by Mr. Allan Trist on:—

"SILVICULTURE IN QUEENSLAND."

Mr. Trist stated that the limited area of forest in Queensland suitable for the economic production of timber calls for the application of correct principles for marketing, protecting and perpetuating these forests. The commercial forest formations of Queensland are:—

1. The Hoop Pine Rain Forest—Coastal Hardwood Formation.
2. The Northern Rain Forest.
3. The Western Cypress Pine—Hardwood Formation.

For each of these forest formations a silvicultural technique has been evolved, and this is briefly described.

In the Hoop Pine Forest areas 17 nurseries have been established with capacity to provide for 3,500 acres of plantation yearly.

In 1938-39 1,400 acres of plantation were pruned for the production of quality timber and 500 acres thinned for the promotion of growth.

In the Coastal Hardwood and Cypress Pine-Hardwood areas, 50,000 acres were subjected to silvicultural treatment in 1938-39, making a total of 330,000 acres that have been so treated.

The planting of exotics on forest country of little or no commercial value is also briefly described.

A seed of the climber *Macrozamia macrocarpa* was exhibited by Miss Williamson. This seed had been obtained in New Guinea where the plant is comparatively common. The seeds have been picked up on the decks of schooners some distance from the land.

EVENING MEETING, 15th April, 1940.—Mr. S. T. Blake occupied the Chair, and about fifty members and visitors were present.

A report on the Geology and Botany respectively of Little Yabba Creek were given by Dr. E. O. Marks and Dr. D. A. Herbert respectively. Reports on the excursion to Birkdale were given by Mr. C. T. White (Botany) and Mr. N. Jack (Birds).

The principal business of the meeting was a paper by Mr. E. W. Bick, Curator of the Brisbane Botanic Gardens on:—

THE EARLY HISTORY OF THE BRISBANE BOTANIC GARDENS.

Sir Thomas Brisbane, when Governor of New South Wales, recommended in 1824 that a Botanic Gardens should be laid out at Brisbane, but it was not until Thomas Brisbane had left Australia and Governor Darling had taken his place that this was given effect to. Charles Frazer, Colonial Botanist of New South Wales, was sent to Brisbane to carry out the plan, and to collect specimens on the Brisbane River and in the surrounding country.

The lecturer then gave a brief account of some of the more interesting of Frazer's findings. The exact area of the Gardens then, is not now known. From 1828 to 1855 the Gardens mainly served for the growing of vegetables and fruit for the convicts and military garrison.

The Gardens at present understood really began with the appointment of Mr. Walter Hill, as Curator in 1855, a position he retained until 1881. Unfortunately, all the early records of the Gardens were lost when the Curator's cottage was destroyed in 1893 by flood.

Exhibits of interest were displayed by:—Mrs. Williams, Plant of *Momordica Charantia* and photographs of early Brisbane; by Mr. J. E. Young, specimens of *Stenocarpus sinuatus*, Wheel of Fire, *Dendrobium superbiens*, *Dendrobium phalaenopsis*, two beautiful orchids of North Queensland, and scales from a Queensland Lung Fish, *Ceratodus Forsteri*; by G. K. Jackson, a Root Chopper from Redbank; by Miss Williamson, Berries from Nuninbah (*Cordyline*, *Calliearpa* and *Ancana*); by Mr. G. H. Barker a book, "Our Country's Butterflies," by W. J. Gordon, containing numerous coloured plates; and by Miss Holland, a nest of one of the larger Honeyeaters.

ANNUAL REPORT.

The Council of the Queensland Naturalists' Club submits the 34th Annual Report of the work of the Club.

Meetings.—Ten monthly meetings, twelve field excursions and ten Council meetings have been held.

Attendance at Council meetings have been as follows: Mr. G. L. Jackson, 10; Mr. H. E. Young, 5; Mr. S. T. Blake, 9; Dr. D. A. Herbert, 2; Miss E. E. Baird, 10; Miss Clarke, 10; Mrs. Jackson, 4; Dr. E. O. Marks, 8; Mr. G. H. Barker, 8; Mr. N. Jack, 7; Mr. J. E. Young, 7; Mr. W. J. Sanderson, 6; Dr. W. H. Bryan, 2.

Evening Meetings.—Attendance at monthly meetings was good, the average being 56. Interesting and instructive lectures have been given by members and visitors. The lecturers included Dr. Herbert, Mr. H. A. Longman, Mr. V. Greening, Mr. T. Marshall, Mr. W. F. Bevington, Prof. Arnold Wall, Mr. G. H. Barker and Mr. C. T. White.

The September meeting was devoted to exhibits, mainly wild flowers, some sent by country members and several lots gathered from nearer localities by town members. Descriptions of these specimens were given by Dr. D. A. Herbert, Mr. S. T. Blake and others.

Exhibits of varied interest have been tabled by members and suitable comments made on them.

Excursions.—During the year Club members have visited several places of interest, including St. Lucia, Petrie, the Museum, Kalinga Park, Mount Coot-tha and Clontarf on Saturday afternoons; Jolly's Lookout and Beerwah for all day trips; Tamborine Mountain and Bribie Island for week-ends and Upper Albert River for Easter. Reports of these trips were given by Dr. E. O. Marks, Dr. W. H. Bryan, Dr. D. A. Herbert and Messrs. J. E. Young, G. Barker, G. Jackson, S. T. Blake and N. Jack.

Membership.—It is with great regret that the death of two Club members—Mrs. Wheeler and Mr. Walter Petrie—is recorded. Membership now is 126. Resignations have been received from four members and twelve members have been admitted during the year.

"The Queensland Naturalist."—Three issues of the Journal have been made during the year.

"Nature Lovers' League."—At the Museum many children have been interested, and signed the Nature Lovers' pledge.

G. L. JACKSON, President.

(Miss) E. E. BAIRD, Hon. Secretary.

LIBRARY REPORT FOR 1939.

The Library still continues to be a popular section of the Club, about 138 magazines and 82 books having been lent to members during the year.

There has been a marked increase in the number of books lent during the past two years, showing that the selection purchased during that time has proved very acceptable to members.

I would like to suggest that a further small selection for the forthcoming year would probably be very well received.

I would also like to thank all those members who have so generously contributed books and magazines to the Library during the year.

EVA M. (Mrs. G. L.) JACKSON,
Hon. Librarian.

LEAVES FROM A GARDEN DIARY.

Presidential Address delivered 18th February, 1940,
by G. L. Jackson.

I must confess that the subject of a suitable talk from me for this occasion has caused me considerable thought.

My interest in natural subjects as studied and observed by this Club has always been a general one, and although I have taken up no special line, that interest has always been a very keen one.

In thinking over these facts, therefore, my mind travelled over the years of my association with the Club, and I wished that I had kept a diary of the many interesting experiences I have had with the Club during those years.

As I thought thus, my eyes glanced (rather casually, I must admit) over the back garden.

Now, don't run away with the idea that that garden is at all out of the ordinary. It isn't. It's a rather "let-run-wild" sort of place—just ordinary backyard size—with a fair number of wild plants and ferns trying to adapt themselves to their surroundings.

Looking at these plants, etc., I realised that here was, in a way, a DIARY—because many of them had been brought home from Club outings and persuaded to live, perpetual reminders of pleasant and informative expeditions.

On one tree is a huge staghorn, reminiscent of a week-end with the Club years ago, at Candle Mountain.

(It was about the size of a five shilling piece when taken from its original nursery on a mossy old log.)

On that occasion, many members will remember the rather rough journey in the mail truck up from Beerwah, and the strange little sledge on which the boarding-house keeper conveyed our luggage up the last stage to the house.

Then, in the morning, the marvellous cloud effects seen from the balcony of the house.

Many incidents, both from a naturalist's point of view and otherwise, served to make this trip memorable, but I think it is indelibly fixed in our minds by the fact that Dr. Marks picked up the half of a stone axe, after

all the party had apparently walked over it—the axe, I understand, being of rather more than usual interest on account of being “chipped” and not “ground.”

A clump of “five-finger” maiden-hair recalls an Easter spent at Cedar Creek, near Mt. Glorious.

We camped in a disused timber mill on that occasion, and not the least of our experiences was the moving picture taken by Mr. John Nebe and shown at the next Club meeting—of members on the march. Truly then did we “see ourselves as others see us.”

I think that the first time I ever saw—and heard—a black cockatoo, was at this time, when we climbed up to the top of Mt. Glorious on the Easter Sunday.

Hidden in among shrubs is a small, and I must admit rather stunted, Moreton Bay Chestnut Tree, and that brings to mind Hopedale, the home of Mr. and Mrs. D. Curtis, at Albert River, and the many enjoyable week-ends made possible to the Club years ago by the late Mrs. S. Curtis.

This little tree grew from a seed got on one of these occasions and recalls the lovely little patch of virgin scrub preserved intact on the bank of the river at the back of the Curtis home, with all its complement of birds and other natural features to be enjoyed by the nature lover.

In the river, just near here, too, I remember a shallow spot, where a domestically-minded catfish had arranged a ring of pebbles, which I was informed was its idea of a “nest.”

In the evenings, too, we were privileged to see the very fine collection of moths and butterflies collected by Mr. D. Curtis.

An arrowroot mill was visited by us on one occasion, and a trip to Tamborine Mountain, where the late Mr. Illidge and Mr. Franzen found great entomological interest, was another enjoyable occasion.

I could spend a great deal of time talking about those trips to Albert River and the many incidents dear to nature lovers, which occurred on those occasions.

A cassia brings to mind Easter Camps at the Coomera Crossing, near Canungra.

On two of these occasions we went, by courtesy of Mr. Romeo Lahey, on the little railway connected with his sawmill, right up into scrub from which, at that time, timber was being obtained.

All along beside the railway line, these cassia bushes, solid masses of golden flowers, were blooming.

Most of us rode on the trucks going out, but some of us thought the engine tender looked safer, and lived to regret it when we saw the havoc created in our appearance by grease, smoke and soot—especially as we were billed to leave for home immediately after this trip, and had no time to wash or change.

The scrub, when reached, was among the loveliest I have ever seen—and full of interest to our little party—the only discordant notes being patches of extremely healthy nettles and some extra ravenous leeches—and even these did not detract very much from our enjoyment of these memorable occasions.

I am very sorry to say that now that particular tract of scrub is of the past. When up that way at the beginning of last year with Mr. Barker and party, we hardly recognised the country, as practically every bit of that wonderful scrub had disappeared and the country given over to lantana and other pests.

It was a sad sight.

At night time, as is usual at Easter Camps, we enjoyed songs round the camp fire, and on one occasion were invited by a neighbouring Scout Camp to their camp fire, where we were entertained by them with songs and recitations.

When we were asked to reciprocate, Dr. Lowson gallantly volunteered on our behalf and contributed some extremely popular numbers.

A clump of oak-leaf ferns recall various Saturday afternoon rambles on and about the Enoggera and Taylor Ranges, and one in particular from Ferny Grove to Ashgrove. At Ferny Grove, a well defined Bora Ring was viewed with interest by Club members on the occasion of one visit.

The beforementioned ferns, attractive clumps of which were seen on the walk, attracted the attention of certain members. They returned, some time later, with the idea of obtaining specimens, and it was whilst in pursuit of this quest that they were reminded, in no uncertain manner, and in a way with which there was no arguing, that they were well within range of the target practice going on at the Enoggera Rifle Range just below. It speaks well for their tenacity of purpose that they DID NOT LEAVE without the ferns.

Another small clump of a very common fern recalls walks along Nursery Road, Mt. Gravatt, and also to Castra—and the very fine wildflowers to be found there



Dipteris conjugata
A new Fern record for Queensland

(Photo Dept. Agriculture & Stock, Brisbane)

at certain seasons. I remember Mr. White making a find of a very rare eucalyptus in the Nursery Road locality.

Two elkhorns act as reminders of the beautiful country round Numinbah—the spectacular Egg Rock—Natural Bridge—and all the interesting events of an Easter spent in that locality.

It is not a plant, but a huge snail shell which takes me back to an outing to Mt. Nebo. This snail was brought back from there alive—and to all appearances immediately started a hunger strike.

He was put in a shady place in the garden, under a sieve, to be observed, and to find out what he did fancy in the way of food. Although he lived for months, opinion is still divided on the subject, but we are nearly sure that ants, varied by little decayed vegetable matter, constituted his diet.

A small cabbage-tree palm, found in the scrub at Caloundra, makes me think of an Easter trip to Caloundra (via the Bribie Passage) which the Club had some years ago.

Reaching Bongaree, on Bribie Island, on the Thursday night, we (that is, the men of the party) slept, or tried to do so, on board the launch which was to take us up the Passage on the morrow. As the launch was anchored and the sea was rather choppy, it really was a most uncomfortable night—and we envied the rest of the party, safely under canvas on dry land.

However, we were more than compensated by the trip up the Passage in the morning.

I have never seen so many black swans altogether, before or since. Literally hundreds clustered on the sandbanks and swam in the shallows.

Many other birds were sighted on this trip, and I think it was on this trip to Caloundra that a very rare ground parrot was seen.

A king orchid (rescued from a watery grave in the Upper Albert River, and now doing well) recalls an Easter Camp of three years ago, which was repeated last year.

One of the most scenic camps we had had, I think, and possibly one of the most interesting to all sections of the Club.

Camped, through the courtesy of Mr. Stevens, on his property, we were in the midst of scenery, the grandeur of which would be hard to beat. With the Lost World

towering on the one hand and Mt. Widgee, backed by Throakban on the other, our Camp, with the tumbling, rushing Upper Albert River at its side, was one which none of us will forget.

Neither will I forget the masses of white cockatoos which, as evening fell, clustered on various trees, making them look like huge masses of white blossoms.

The geologists, too, I think, found this camp of interest—as on one long walk up hill and down dale for several miles, they introduced us to a coal seam, and when we reached Christmas Creek, an apparently absorbing argument of, I understand, about 20 years' standing, was resumed with great goodwill.

When watching our geologists at work, I am always reminded of the words of the English poet, William Wordsworth:—

. . . . you may trace him oft
By scars which his activity has left
Beside our roads and pathways, though, thank Heaven
This covert nook reports not of his hand;
He who with pocket hammer smites the edge
Of luckless rock or prominent stone, disguised
In weather-stains or crusted o'er by Nature
With her first growths, detaching by the stroke
A chip or splinter—to resolve his doubts.
And, with that ready answer satisfied,
The substance classes by some barbarous name,
And hurries on; or from the fragments picks
His specimen, if but happily interveined
With sparkling mineral, or should crystal cube
Lurk in its cells—and thinks himself enriched,
Wealthier, and doubtless wiser, than before.

Various small orchids are reminiscent of trips to Behnont, the Goodna Scrub, Cash's Crossing and Sunnybank.

Sunnybank has been the scene of a great many of our trips in search of wildflowers, as has Bribie Island; in fact, the last named place has become one of our most popular week-end trips of late years.

These are just a few of the leaves from my garden diary, which serve to bring to my mind outings of this Club—outings filled with interest to the nature lover—whether he be a scientific man, or, like myself, just a person having an interest in Nature and the great Out-of-doors.

A NEW FERN RECORD FOR QUEENSLAND.

By D. A. Goy (Botanic Museum and Herbarium,
Brisbane.)

Early in November, 1939, specimens of a fern were received from Mr. M. J. Manski, of Cairns, who is keenly interested in this particular branch of botany. Mr. Manski stated that the specimens were sent to him by Mr. M. R. Giddins, of Babinda, who had obtained them at Jordan Creek, near the gold mines, in the Palmerston area. As neither of them had seen it before, they were anxious to know what it was.

The fern was identified as *Dipteris conjugata* Reinw., a native of Malaya-Polynesia, but not previously found in Australia, although it is very common in New Guinea.

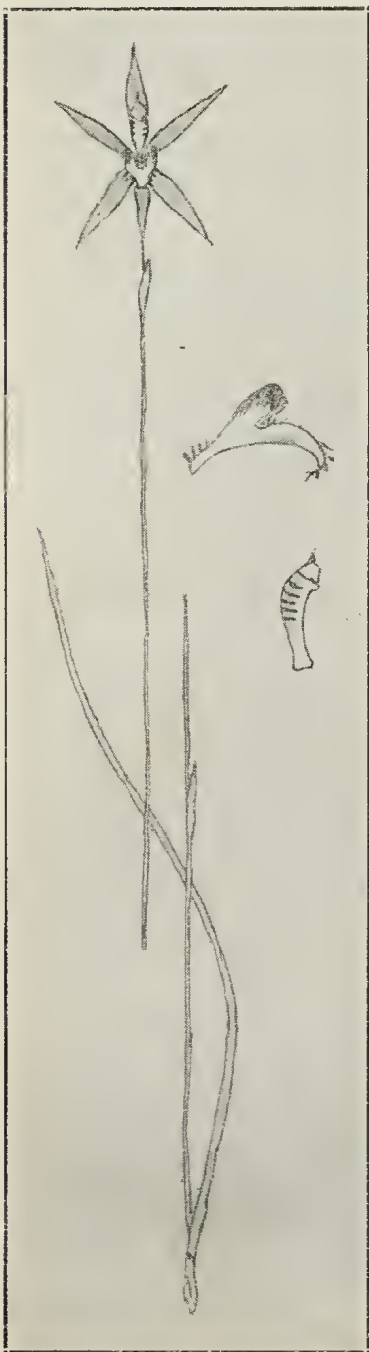
Dipteris is a distinctive and interesting genus possessing several primitive characters. There is much controversy as to its correct position in fern classification. Some authorities contend that it represents a primitive form from which the newer Polypodiaceae have been derived, and should be placed in the family Polypodiaceae, subfamily Dipteridoideae. However, it has also definite affinities with *Matonia*, an archaic Malayan genus in the family Matoniaceae, and on this account others prefer to make a separate family (Dipteridaceae) for it.

This plant is quite distinct from any previously recorded Australian fern. The fronds bear a slight superficial resemblance to the Elkhorn (*Platynerium bifurcatum*) and Staghorn (*Platynerium grande*), but the habit of the plant is very different. It is a terrestrial with a scaly, creeping rhizome from which fronds on long stipes arise singly at varying intervals. The stipes on the specimen from North Queensland measured 75 cm., but part of the base was missing. The fronds are flabellately dichotomous, thick in texture (coriaceous), slightly glossy to dull green on the upper surface, usually glaucous beneath. The blade of the frond sent in measured 55 cm. long and about 90 cm. broad. The fronds are completely divided into two halves; each half is more or less deeply divided into four parts which are themselves once or twice forked. The margins are irregularly coarsely serrate. The veins are dichotomous, prominent especially on the lower surface, the intermediate veinlets forming a dense network. The sori are very small and numerous, without an indusium and irregularly covering most of the under surface of the frond.

A DISTINCTIVE FORM OF CALADENIA CARNEA, R.Br.

C. carnea var. *gracillima*, var. nov.

By the Rev. H. M. R. Rupp, Northbridge, N.S.W.



It is now nearly ten years since the Rev. E. Norman McKie, of Guyra, N.S.W., sent me a generous number of specimens of a *Caladenia* which he had found during a holiday in the Yandina district of South Queensland. At first I was inclined to think it was an undescribed species; but subsequently I told Mr. McKie it would be difficult to distinguish it specifically from *C. carnea*, which exhibits so many variations from the type and there the matter was allowed to rest. Recently I have had the leisure and the opportunity to make a more exhaustive examination of the flowers at the National Herbarium in Sydney. While adhering to the opinion that this dainty and attractive little orchid may and should be placed in *C. carnea*, it is so distinctive, both in its general appearance and in some of the floral details, that I feel it merits definite varietal rank. In allusion to its exceedingly slender and graceful form, I propose that it be recognised as var. *gracillima*.

Planta gracillima, 12-24 cm alta. Sepala petalaeque angustata, acuminata, rosea. Labellum angustatum, alte trilobatum; lobi laterales interdum purpurei; lobus medius ad apicem flavus aut aurantiacus: calli omnes aurantiaci aut rubri. Columna 4-5 lineis transversis rubris.

With the possible exception of var. *gigantea*, this is the most attractive form of *C. carnea* I have seen. The colour of the perianth

is rose pink. The segments are narrow and acuminate. The labellum is very beautiful. It is narrower than in other forms, and is more deeply 3-lobed. The lateral lobes are often stained with purple. The calli of the disk are relatively large, orange-coloured deepening to red, and the marginal calli of the mid-lobe are similar. The apex of the mid-lobe is either yellow or very dark orange. There are no transverse red bars on the labellum, but the column invariably has from three to five across the upper portion on either side, not in front.

The colouring of all parts of the labellum is retained quite remarkably in dried specimens.

The accompanying figure represents a plant approximately natural size, with side views of the labellum and column enlarged.

A CLEVER PLANT.

A good example of the way in which plants are able to look after their own welfare occurred at Toowong recently. During a dry time a self-sown pumpkin plant sprang up about five yards from the house. It sent out one runner, and one only, which travelled in a direct line up hill, the grade being about one in seven, to a open drain trap alongside the house. When it reached the drain it produced a bunch of root-like shoots which passed through the grating towards the water about one foot below, thus obtaining access to moisture which was not available in any other direction. At this stage the plant was accidentally destroyed.

E. Kay Robinson, the English naturalist, has recorded a somewhat similar instance. He said: "I once saw a jessamine plant which had scrambled over an outhouse and sent down a vigorous shoot, five feet in length, straight towards a drain in the corner below. When it was within three inches of the drain, the shoot turned abruptly and went straight up again for about four feet and over the fence. At the point where it turned, a cluster of fat little whitish rootlets grew out, and the fact that from that point the ascending part of the shoot was stronger and thicker than that which came down, showed that these rootlets were getting nourishment from the damp air of the drain. But there seemed almost human method in the plant's action in coming down all that way to fetch it, and going up again as soon as it had got what it wanted.

C.W.H.

A FLIGHT OF BUTTERFLIES.

About 9 a.m. on November 30th at Wilston, near Brisbane, I went to see if there were any letters in the box. I saw dozens of white and black edged *Anaphacis jara teutonia* F. butterflies feeding on the lantana hedge, and looking around I saw dozens more, all flying from the S.S.E. direction towards the N.N.W. direction. Most of them stopped to feed on the lantana and then on again. They did this all day. About 2.30 p.m. they were decreasing in numbers and about 5 p.m. had about disappeared. I caught some of them. I saw some brown marked ones, but not many, also some little bluey grey moths, but they fed on the clover. There were also a lot of bees feeding, but they didn't disturb the butterflies at all. Years ago, when driving to Tingalpa in a sulky, I saw a similar sight, and they appeared to be travelling in the same direction. It was a hot day, too.

H. M. COCK.

OBITUARY.

Mr. J. O'Neill Brennan.

The death of Mr. J. O'Neill Brennan on Tuesday, 12th March, leaves the Naturalists' Club mourning the loss of one who took an active part in our excursions and meetings. Mr. Brennan had an extensive knowledge of the birds of Queensland and was ever willing to give the information to members of the Club. He was born at Gerryowen, Sydney, 85 years ago and was the son of Mr. J. O'Neill Brennan, Coroner and Sheriff of New South Wales. He came to Queensland as a young man. In public life in this State he was known as Immigration Officer and his kindly personality smoothed the way for many strangers here. As Immigration Agent he directed the work of the deportation of Kanakas from this State to their home islands when the White Australia Policy became the national policy of Australia.

QUEENSLAND NATURALISTS' CLUB.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR THE YEAR ENDING 31st DECEMBER, 1939.

RECEIPTS.			EXPENDITURE.		
	£	s d		£	s d
Balance forward from 1938	53	17 9	Rent—Women's Club Rooms	12	10 0
Subscriptions and Donations	50	13 0	Insurance—Bookcase and Library	0	2 6
Sales of—			Telephone	5	10 3
Nature Lovers' Certificates	16	7 8	Petty Cash	10	0 0
“Queensland Naturalist”	0	14 0	Subscriptions, Mr. Marshall's “Barrier Reef” Film—		
Surplus, Easter Camp	8	0 0	Queensland Naturalists' Club	1	1 0
Interest, Savings Bank A/c.	1	2 3	Nature Lovers' League	1	1 0
			Barkers' Bookstores, Subscriptions to various Magazines	2	2 0
			C. J. Walker—Wrappers for “Naturalist”	1	19 0
			Edwards Dunlop—Index Cards	1	3 1
			Clark and Mackay—Printing “Naturalist”	0	11 7
			Balance—Cash in Bank (includes £30/17/2, Nature Lovers' League) ..	42	9 0
				54	7 3
				<u>£130</u>	<u>14 8</u>

TENT A/C.

	1939—			£	s	d
To Surplus, Easter Camp	..	..	..	8	0	0
By Balance Owing Club Funds	..	..	..	..	..	..
„ Balance Funds in Hand	..	..	..	..	..	..
				£8	0	0
				£8	0	0

NATURE LOVERS' LEAGUE A/C.

	1939—			£	s	d
To Balance on Hand	..	..	..	15	10	6
„ Sales of Certificates—				By ppn. donation, Mr. Marshall's "Barrier Reef" Film		
March	..	..	..	4	2	1
May	..	..	..	2	15	6
July	..	..	..	2	18	3
September	..	..	..	2	10	9
December	..	..	..	4	1	1
				£31	18	2
				£31	18	2

(Miss) H. F. CLARKE, Hon. Treasurer.

C. W. HOLLAND, Hon. Auditor.

THE QUEENSLAND NATURALIST

JOURNAL OF THE QUEENSLAND NATURALISTS' CLUB
AND NATURE-LOVERS' LEAGUE

VOL. XI

NOVEMBER 1940

No. 5

PROCEEDINGS.

EVENING MEETING, 15th APRIL, 1940.

The chair was occupied by the Vice-President (Mr. S. T. Blake), and about 40 members and visitors were present. Misses Duncan, Shackleton, Savage, and Ladewig; Messrs. Whitby, Riek, Wright and Langdon were elected members of the Club. Reports on the geology and botany of Little Yabba Creek were given by Dr. E. O. Marks and Mr. S. T. Blake respectively. Reports on the excursion to Birkdale were given by Mr. C. T. White (botany), Mr. N. Jack and Mr. G. H. Barker (birds). The chief business of the meeting was a lecture by Mr. E. W. Bick, Curator of the Botanic Gardens, on the history of the Botanic Gardens, Brisbane. Exhibits were made by Mr. G. H. Barker of a rare work on British butterflies and moths; Mrs. Williams, photographs of old Brisbane; Mr. G. Jackson, aboriginal grinding stone; Mr. J. E. Young, flowers and seed pods of the Wheel of Fire (*Stenocarpus sinuatus*); Miss Holland, nest of a friar bird; Miss Williamson, native fruits from Numinbah Valley; Miss E. N. Baird, photographs of Tamborine Mountain.

EVENING MEETING, 20th MAY, 1940.

The President (Mr. H. E. Young) occupied the chair, and 30 members were present. Reports on excursion to Tamborine Mountain were given by Dr. E. O. Marks (geology), Mr. C. T. White (botany), and Mr. N. Jack (birds). The principal business of the meeting was a lecture by Mr. W. G. Wells on Soil Erosion. The lecture was well illustrated by a fine series of lantern slides of the effects of erosion, especially in the United States.

EVENING MEETING, 10th JUNE, 1940.

The Vice-President (Mr. S. T. Blake) occupied the chair, and 36 members and visitors were present. Mr. J. O. Fabert was elected a member of the Club. The prin-

cial business of the meeting was a lecture by Mr. H. W. Hermann on Shells. Mr. Hermann illustrated his remarks by a very fine series of specimens, representing Australian and exotic species.

EVENING MEETING, 15th JULY, 1940.

The President (Mr. H. E. Young) occupied the chair, and about 36 members and visitors were present. Mr. S. T. Blake gave a report on the botany of excursions to Closeburn and Ormiston House. The principal business of the meeting was a lecture by Dr. Hamlyn Harris on Animal Parasitism.

EVENING MEETING, 19th AUGUST, 1940.

The President (Mr. H. E. Young) occupied the chair, and about 40 members were present. The President remarked that as Miss Clarke, the energetic Hon. Treasurer, had been transferred to Mackay, the Club had arranged an afternoon tea at One Tree Hill for Miss Clarke, and presented her with a writing case as a token of the esteem with which she was held by the members. Reports on the excursion to Sunnybank were given by Mr. S. T. Blake (botany), and Miss Holland (birds). The principal business of the meeting was a couple of lectur-ettes on Mangroves by Dr. D. A. Herbert and Mr. C. T. White.

EVENING MEETING, 16th SEPTEMBER, 1940.

The Vice-President (Mr. S. T. Blake) occupied the chair, and 45 members and friends were present. Miss Jones and Miss Bolton were elected members of the Club. Reports on the excursion to Point Lookout were given by Dr. W. H. Bryan (geology), Mr. S. T. Blake (botany), and Mr. G. H. Barker (ornithology). Mr. G. H. Barker handed in a list of 80 birds received from Mr. N. Jack. Mr. Jack, who is at present situated in the Glasshouse Mountains area, had made this list of the birds he had seen during the last couple of months. The chief business of the meeting was a wild flower show. A good display was staged, and the thanks of the Committee is due to the various members who helped to make the show a success.

COMPARISON OF NATIVE ROCK SHELTERS OF SYDNEY AND MORETON BAY

By G. K. Jackson.

Whilst on a recent visit to the upper parts of the Lane Cove River, Sydney, I was lucky enough to discover

several native rock shelters.

Used by the aborigines in earlier days, these take the form of shallow caves, weathered out in the adjacent sandstone bluffs, by the action of wind and water.

They are similar in every way to those found in the Moreton Bay district, but occurring under similar circumstances, and in a coastal area, this is not surprising.

The Lane Cove River was known to the local aborigines as "Turrumburra," the meaning of which I believe is "high land."

The country round about is certainly high and rugged, and the river itself cuts a deep bed through the vast layers of sandstone which occur in that district.

The tribe which, before the advent of the white man, roamed this locality, was known as the "Kimalroi" and was very closely related both in language and customs to the "Bigambul" tribe of the Darling Downs, Queensland.

There is a distinct train of evidence connecting these two sections from the Darling Downs to the Port Jackson district.

The situation and environments of the rock shelter are the next point to consider. The river at this part is still tidal, and is fringed by a narrow strip of river mangroves on either side, thus supplying an ample, if not very varied, menu of salt-water shell fish.

The country around is the usual, rather sterile eucalyptus forest of that area. It, however, would provide meat in quite a number of forms for these nomadic people.

The rock shelters are really overhangs, at the base of small cliffs, not very far above high-water level. On the floor is a thick layer of sand (the product of weathering) and in it are quantities of old shells, the remains of former feasts on that site.

The most common is the oyster (*Ostrea cucullata*), obtained from the rocks and mangrove roots, and also by diving down to the river bed. We find, too, the common "hercules club" shell of the mud flats (*Pyrazus herculeus*). This is interesting in view of the fact that aborigines have smashed off the sharp point at its base, thus breaking the vacuum within. The animal was then quite easily sucked or poked out of its shell.

The third specimen is that known nowadays as the

Sydney cockle (*Arca trapezia*), also occurring in considerable quantities.

There appeared to be nothing startling in the way of flaked stones, or pieces of bone, but the charcoal of former fires is still heavily mixed with the sand on the cave floor.

The camping caves of Moreton Bay which I have in mind are situated on Point Lookout, Stradbroke Island. They, too, are weathered out of, in this case, rhyolitic cliffs, by the action of the sea and wind, and have been in use at a much more recent date than those of Port Jackson.

They were occupied by members of the Noonukul tribe, and one can still find countless numbers of fish scales and fish bones mixed with the sand and ash on their floors. Amongst the debris also are pieces of turtle bone and shell, kangaroo bones and the shells of the eugarie (*Donax deltoides*).

All these remains are buried beneath about one foot of sand, and amongst them I was lucky enough to collect two very interesting articles.

(1) A eugarie shell spoke shave, used for the purpose of scraping down boomerangs and spears to the required shape. The shell has a hole drilled through the centre, and was held with the concave side to the palm of the hand, when in use.

(2) An oval breast ornament of mother of pearl which, when in use, was hung from the neck of the individual by a piece of cord.

Both these tribes have passed away, but behind them they have left a vivid memory in these few remains which build in our minds a clear visual picture of their daily life before we occupied their land.

THE VEGETATION OF GOAT ISLAND AND BIRD ISLAND IN MORETON BAY

by

S. T. Blake, M.Sc., Biology Department,
University of Queensland.

INTRODUCTION

In Moreton Bay, a short distance off Duuwich, Stradbroke Island, lie Goat Island and Bird Island, approximately in latitude $27^{\circ} 31' S.$, and longitude

DEAD CORAL REEF

REFERENCE

-  MANGROVE CANOPY
-  CANOPIES OF OTHER TREES (A·ACACIA, C·CUPANIA, E·EXCOECARIA, H·HIBISCUS, M·MYOPORUM, P·PANDANUS, T·THESPIA, V·VITEX)
-  SESUVIUM ZONE
-  SPOROBOLUS ZONE
-  LANTANA THICKET
-  BLADY GRASS, RED NATAL GRASS, ETC.
-  PRICKLY PEAR
-  SMILAX (WHEN PURE)



VEGETATION MAP
OF
GOAT ISLAND
SHOWING
CHIEF ZONES AND CANOPIES

0 10 20 30 40 50 YARDS
SCALE



DEAD CORAL REEF

SURVEYED AND DRAWN BY S.T. BLAKE

153° 24' E. During the first expedition to Moreton Bay organised by the Science Students' Association of the University of Queensland in January, 1938, the writer studied the vegetation of these small islands, the account of which follows. Thanks are due to the Association for the opportunity of visiting these islands, and to Miss V. May, M.Sc., Department of Botany, University of Sydney, for the identification of the marine *Algae* collected. Unfortunately, however, owing to difficulties arising from the confusion in the literature, Miss May has found it impossible as yet to determine most of the *Rhodophyceae*.

These two islands, which are distinct from each other only at high water, are surrounded to the east, south, and west, by a very gently sloping platform which is covered at high tide and partly submerged at low water. This platform is about 1,250 yards long and about 600 yards wide, the elongation being north and south. Its edge is about 6 feet below Mean Low Water, whence it descends abruptly to 15 feet or more, except along the south-eastern margin, which is not so well defined. The highest point at the northern end of Goat Island is about 5 feet above Mean Low Water. This platform consists of a dead coral fringing reef, with living coral on those parts below Mean Low Water. The reef has been built around a focus of sandstone of Mesozoic age which outcrops in the south-east. There is a sand-flat in the north-eastern and central parts and a small mud flat on the western side, a little to the north of the middle. Goat Island consists of a mass of sand on an accumulation of sandstone boulders, about 200 yards long, up to nearly 40 yards wide, and up to 12 feet above Mean Low Water. It also has its elongation in a north-south direction. Bird Island is merely a tiny sand-bank near the north-western edge of the reef.

VEGETATION.

The Marine vegetation of Queensland is so poorly known that no conclusions can be drawn from the present study, which must be accepted simply as a presentation of facts so far as yet observed. On the other hand, the terrestrial vegetation was studied in detail, and a map of Goat Island was prepared to show the area occupied by each community and the area of the canopies of the larger woody plants.* Bird Island carries no vegetation what-

*The outline of the Island shown on the map is 8 feet above M.L.W., and represents Spring Tide level. It is taken from the Plane Table Survey of Messrs. J. L. Clayton, W. Bryan, and A. M. Tuffley.

soever, while that of Goat Island is relatively quite rich and varied, consisting of 64 species in six communities.

The various communities observed may be arranged as follows:—

1. MARINE VEGETATION, with four communities—

A. The *Zostera nana*—*Halophila ovalis* community. This community is developed on the muddy area off Bird Island at about and just below low water mark. The primary condition for the establishment of the community appears to be a certain amount of mud in the substrate. Once established, the plants (both of which possess creeping rhizomes) stabilise the substrate and gradually raise it by collecting further mud, until eventually mangroves (*Avicennia officinalis*) establish themselves. This establishment of mangroves is not realised on Bird Island, but the succession is plainly to be seen near Myora on Stradbroke Island.

B. A mixed Algal community on the reef near the above but somewhat to the south thereof, from just above low water mark to at least 2 feet below. This is where the majority of species was collected. *Phacophyceae* predominate in species and individuals. The species observed were *Cystophyllum muricatum*, *Dictyota dichotoma*, *Sargassum* sp. (subgen. *Eusargassum*), and *Padina pavonia* (*Phacophyceae*); *Caulerpa racemosa* (fairly common) and *Halimeda maculosa* (*Chlorophyceae*); *Polysiphonia* sp. (epiphytic on *Dictyota*) and *Laurencia* sp. (*Rhodophyceae*).

C. An Algal community associated with living coral to the west of the south end of Goat Island. *Cystophyllum muricatum* and *Padina pavonia* are almost the sole members of this community and are very numerous in individuals. *Halimeda* is occasional. *Lithothamnion* sp. occurs here and between this and the former community.

D. Between the two islands, at slightly above low water mark, there is a community of numerous individuals belonging to two species. One of these, belonging to an unidentified genus of the *Rhodophyceae*, is slightly calcified and brittle, and invariably occurs attached to the shell of a certain living lamellibranch (*Mytilus* sp.). The other, *Blossevillea* sp. (*Phacophyceae*), though occasionally found attached to this shell, is most often attached to coralline fragments.

Off the east side of the islands, poorly developed communities of the second and third types were observed. Several examples of *Algae* growing epiphytically on others were noticed.

2. TERRESTRIAL VEGETATION. Bird Island supports no terrestrial plants, but on Goat Island are to be seen the following communities:—

E. Mangroves. At about half-tide mark, on a rocky substrate, a belt of mangroves surrounds Goat Island, except at the narrow northern end where it adjoins Bird Island. The belt is broad in places, in others narrowed down to the width of a single tree, and near the north end the belt becomes broken owing to the distance between trees. *Avicennia officinalis* is by far the commonest tree, and on the east is almost the only species. On the west and south-west the development is enriched by the common occurrence of *Aegiceras corniculatum*, which forms a lower story, an occasional small plant of *Rhizophora mucronata* showing well the stilt roots so characteristic of the species, and a few trees of *Bruguiera Rheedii* at the landward edge.

None of the mangroves exceeds 20 feet in height, while those of the east and south show well the dwarfing and shearing effect of the predominant south-east wind. The effect of the wind can be seen on most of the trees on the island by the pronounced reduction in growth of the south-east portion of the canopy.

F. Between the landward edge of the mangroves and high water mark is a sloping sandy beach mostly 5–8 yards wide (narrower at one or two points only), quite bare of vegetation except for a very occasional tree of *Avicennia*.

G. At spring tide mark there is a distinct tendency for the production of a strand flora. Particularly in the northern part is a well-developed but narrow zone of *Sesuvium portulacastrum* with *Mesembryanthemum aequilaterale*. The former occurs at intervals elsewhere along the coast, and particularly towards the south-west. Towards the north an occasional plant of *Suaeda maritima* occurs.

H. Immediately behind this *Sesuvium* zone, and mingling with it in places, is a much broader zone of the grass *Sporobolus virginicus*, with *Wedelia biflora* and

Canavalia obtusifolia (occasionally in the former zone) in places, with more or less scattered *Lepturus repens* and *Stephania hernandiifolia*. All of these are creeping or rambling plants.

I. At spring tide mark also is developed a more or less broken line of small usually bushy trees, comprising *Hibiscus tiliaceus*, *Thespesia populnea*, *Myoporum ellipticum*, *Cupaniopsis anacardioides*, *Vitex Negundo* (usually as a ragged shrub), *Excoecaria Agallocha*, and an occasional *Pandanus pedunculatus*. The northern end is treeless; elsewhere the line is dense in some places, broken in others. The *Sporobolus* zone persists under the trees except in the densest shade where it is very open, and small communities of *Peperomia leptostachya* may occur on any rocks present. Where there is no rock, *Commelina cyanea*, *Oplismenus undulatifolius*, and *Cyperus enervis* sometimes occur, with *Tetragonia expansa* in less densely shaded places. *Crinum pedunculatum* occurs occasionally.

J. Further inland, extending throughout the island and reaching spring tide mark in places through gaps in the tree-line occur two communities. In one, *Lantana camara*, with or without *Smilax australis*, forms dense thickets, occasionally with *Cyperus enervis* underneath. Through the thickets arise a few groups or scattered individuals of the small trees *Hibiscus tiliaceus*, *Cupaniopsis anacardioides*, an occasional *Pandanus pedunculatus*, and, in the north, a few trees of *Acacia Cunninghamii*. On the edge of the thickets, or within them, *Macaranga tanarius* is very common as fairly young plants up to 8 feet or so high.

K. In the openings between the thickets is a more or less close vegetation of *Rhynchelytrum repens* (red natal grass), *Imperata cylindrica* var. *Koenigii* (blady grass), *Digitaria longiflora*, *Agropyron scabrum*, *Cymbopogon refractus* (barb-wire grass), *Erigeron crispus*, *Sonchus oleraceus*, *Bidens pilosa*, *Dianella caerulea*, and clumps of prickly pear (*Opuntia inermis*), the latter also occurring in the openings at and near high-water mark in the *Sesuvium* and *Sporobolus* zones.

Throughout the island there occur the climbing plants *Cissus opaca*, *Cayratia clematidea*, *Rubus parvifolius*, *Ipomoea cairica*, *Eustrephus latifolius*, and occasional *Smilax australis*. The rootless and leafless parasite *Cassytha glabella* is very common. The *Cissus*, *Cayratia*,

Eustrephus, and *Ipomoea* climb over the lantana thickets, and with the addition of *Sarcostemma australe* and *Jasminum didymum*, also over the members of the *Hibiscus* zone.

There is roughly a distinction between the flora of the north and of the south portions. Towards the north *Macaranga*, *Cymbopogon*, and *Digitaria longiflora*, together with the *Acacia* and *Imperata* tend to become very common. Towards the south these disappear with the exception of the *Imperata*, while *Agropyron* becomes more prominent, and *Sophora tomentosa* is noticeable with occasional *Mallotus philippinensis* and *Cudrania javanensis* at the edge of the lantana.

The vegetation of the interior of the island is evidently an induced one, the trees representing a remnant of the original vegetation. There is a high proportion of exotic plants, and this with their comparative dominance in the open spaces and the shape of the latter, together with the marks of fire, all indicate that much of the original vegetation has been destroyed.

LIST OF PLANTS FOUND ON AND NEAR GOAT AND BIRD ISLANDS.

I.—MARINE PLANTS.

Algae:

Blossevillea sp.

Caulerpa racemosa J.Ag.

var. *laetevirens*

forma *typica* Weber van Bosse

Cystophyllum muricatum (Turn.) J.Ag.

Dictyota dichotoma (Hnds.) Lamour

Halimeda macroloba Decne.

? *Laurencia* spp.

Padina pavonia (L.) Lamour

? *Polysiphonia* sp.

Sargassum sp. (subgen. *Eusargassum*)

Phanerogams:

Halophila ovalis (R.Br.) Hook.f.

Zostera nana Roth

II.—TERRESTRIAL PLANTS

Trees and Shrubs:

Acacia Cunninghamii Hook.

Aegiceras corniculatum (L.) Blanco

Alphitonia excelsa Reissek ex Engl.
Avicennia officinalis L.
Bruguiera Rheedii Blume
Cupaniopsis anacardioides (A. Rich.) Radlk.
Excoecaria Agallocha L.
Ficus platypoda A. Cunn.
Hibiscus tiliaceus L.
Lantana camara L.
Maba geminata R.Br.
Macaranga Tanarius (L.) Muell.Arg.
Mallotus philippinensis (Lam.) Muell.Arg.
Myoporum ellipticum R.Br.
Opuntia inermis Moris & De Not.
Pandanus pedunculatus R.Br.
Rhizophora mucronata Lam.
Thespesia populnea Corr.
Vitex Negundo L.
Wickstroemia indica (L.) C. A. May

Lianas and Trailers:

Bryonopsis laciniosa (L.) Naudin
Canavalia obtusifolia DC.
Cassytha glabella R.Br.
Cayratia clematidea (F. Muell.) Domin
Cissus opaca F. Muell.
Cudrania javanensis Trecul
Eustrephus latifolius R.Br.
Ipomoea cairica (L.) Sweet
Jasminum didymum Forst.
Rubus parvifolius L.
Sarcostemma australe R.Br.
Smilax australis R.Br.
Stephania hernandiifolia (Willd.) Walp.
Vincetoxicum carnosum (R.Br.) Benth.
Wedelia biflora (L.) DC.
Rhynchelytrum repens (Schumach.) C. E. Hubbard
Solanum nigrum L. (sens. lat.)
Sonchus oleraceus L.
Suaeda maritima Dumort

Creeping Herbs:

Commelina cyanea R.Br.
Digitaria longiflora (Retz.) Pers.
Imperata cylindrica (L.) Beauv. var. *Koenigii* Dur. & Schinz
Lepturus repens (Forst.) R.Br.

Mesembryanthemum aequilaterale Haw. sens. lat. (= *Carpobrotus* sp.)

Oplismenus undulatifolius (Ard.) Beauv. (?)

Sesuvium portulacastrum L.

Sporobolus virginicus (L.) Kunth.

Erect Herbs:

Agropyron scabrum (Labill.) Beauv.

Bidens pilosa L.

Cheilanthes Sieberi Kunze

Crinum pedunculatum R.Br.

Cymbopogon refractus (R.Br.) A. Camus

Cyperus enervis R.Br.

Dianella caerulea Sims.

Erechthites arguta DC.

Erigeron crispus Pourret

Geodorum pictum (R.Br.) Lindl.

Gnaphalium luteo-album L.

Peperomia leptostachya Hook. & Arn.

Other Plants:

Merulius lacrymans (Wulf.) Fries

Botrydiaceae

Polyporaceae

Lichen

Moss

} Undetermined

SOME BIRD ASSEMBLINGS.

By J. Edgar Young

Some time ago I was asked by a member of our Club if I had ever seen a large gathering of magpie-larks or "Pec-wees," and what could be the reason of such gatherings.

As a matter of fact, I have seen this peculiarity in the habits of several species. In the first place I should say that I do not refer to the annual gatherings of the migratory birds, nor to those birds which habitually live in families; such, for instance, as the babblers, apostle birds, white-winged choughs, all of which live in companies of twelve to fourteen birds, nor to the wrens, finches, parrots, and many others.

The first I shall comment on is the magpie-lark or "Pee-wee" (*Grallina picata*). My attention was first drawn to these about forty years ago, when on the Logan River (South Queensland) I saw a very large number at Eagleby, near Beenleigh. The exact area covered by them

I can only estimate as at least a mile of the river flats, and the number of birds as many hundreds, possibly thousands, distributed evenly over the area and feeding as usual.

I have since on several occasions seen gatherings of these same birds, at the same time of year, autumn or early winter, even to seeing them in many scores where I now live at Graceville, when some of our trees would at nights be supporting quite a large feathered population.

Mrs. Herbert Curtis, of North Tamborine, a keen nature student and photographer, who first mentioned the matter to me, saw a large gathering of these birds in the neighbourhood where she lives.

Mr. J. Colclough, taxidermist, Queensland Museum, reports having seen a similar gathering on the Nudgee Flats.

The next species that I particularly noticed was the Friar bird, or Leatherhead (*Philemon corniculatus*), in the State Forest at Barakula, north of Chinchilla, on Hell-Hole Creek: here it seemed that every tree (mostly eucalypts) accommodated a dozen or more, the total number must have run into thousands, and the noise of their chatterings was simply deafening.

About three years previously I had seen a large number of these birds at Graham's Creek, on the Mary River, but these may have been incidental to a plague of caterpillars on the grass, and every stump, fence post and tree was occupied by well-filled and silent leatherheads. Whether the caterpillars were merely co-incidental to a collection of the birds, or the birds had collected to feed on the caterpillars I cannot say; I do not even remember the time of the year.

On the Upper Albert River, near to the spot where our Club has had two annual camps, I saw, in 1935 I think, a collection of black-backed magpies (*Gymnorhina tibicen*), and in one glade of 150 to 200 yards there were some thirty or more of these birds for several days. These are rarely seen in more than pairs, and usually at no closer intervals than about half a mile.

At Muckadilla, on the Western line, in May, 1936, on the block of land comprised and occupied by the hotel and bore, with hot medicinal baths, an area of two or possible three acres, I counted some thirty black and white fantails (Willie wagtails) (*Rhipidura leucophrys*). Although these are common birds, they are rarely seen in

more than pairs. This gathering would hardly have been owing to lack of water as there were numerous water-holes up and down Muckadilla Creek, and at other places at the time.

Doubtless a number of other birds with the same habit might be added to this list with more careful observation, and I shall be glad to hear of any such, especially of any other species, from readers.

The reasons for such gatherings may so far be only conjectural. The best reason I can suggest is as follows:

That it may be a provision of Nature causing some of those birds which do not have the migratory urge and habit, to gather together in certain seasons, during which gatherings, usually occurring in autumn or early winter and before the breeding period, they by some means manage to readjust their family alliances, thus accomplishing what probably happens during the annual migrations of other birds, and by such means preventing the inbreeding, which would probably occur amongst birds which always remained in the one locality.

I may mention three other birds, and I do so with due reserve, as I am not certain if they belong to the same category as those previously mentioned.

The Bush Lark (*Mirafra javonica*), seen in northern inland Queensland in September, 1937, in forest and grass in a scattered flock of a few scores over an area of two or three acres.

The Pratincole (Swallow-Plover), seen in large numbers over two or three miles of plain country near water about 100 miles south of Hughenden, August-September, 1937.

The Frigate Bird (*Fregata* sp.), seen in South-East Papua, July, 1929, in a large company of three or four score.

THREE NEW CHALCIDOIDEA FROM AUSTRALIA.

By A. A. Girault, B.Sc.

Lincolna Girault, nov. Miscogasteridae.

About half the size of *Trichilogaster* Mayr (type *xanthocephalus* compared), and the antennae are inserted distinctly below the middle of the face, slightly below the eyes. Axillae joined or nearly. Abdomen depressed, widest at the middle, the second segment a fourth of the surface, exceeding Nos. 3 and 4, which are equal, but No. 5

is apparently the longest. Postmarginal vein slightly exceeding the marginal, the stigmal still shorter, distad curved, long, the marginal short as compared with the submarginal (not half it). Hind tibial spurs single. Submarginal vein broken at apex (pale). Mandibles bidentate, the second tooth widely truncate but acute-angled at the corner nearest the acute first tooth.

Antennae 12-jointed with two ring-joints, three club joints, the pedicel exceeding any funicle, short, the club not more than half the length of the funicle (at least distinctly shorter than it). Metatarsus a half longer than wide, equal to the (hind) tibial spur, short; in the middle leg, the first joint of the tarsus is twice longer than wide, also equal to the tibial spur (middle), which is also longer. Furrows deep, complete. Pronotum transverse, the propodeum much less so, with a delicate though distinct median carina. Palpi concealed. Fringe present, abundant, short.

The male is the same but the abdomen is still more compressed and narrower, the scape shorter. From the type of *Neosystasis* (types compared), this genus is non-metallie, the metatarsus much shorter, so the marginal vein (equal to the submarginal in the other); the abdomen is flatter; and so forth. Named for the great Abraham Lincoln.

Lincolna aldrovandii Girault, nov.

Black and finely polygonally reticulate, the legs lemon colour except the hind coxae and the femora (especially in legs Nos. 1 and 3), except widely at apex; antennae dusky, the fore wings distinctly so except proximad from the base of the bend of the submarginal vein, the bristles of the latter long and slender, those of the marginal short. The immediate base of the wing is also dusky, the hyaline areas of the wing being as noted, a rectangle against the marginal vein, the area between the postmarginal and stigmal veins and a longer crescent mid-longitudinally below the middle of the wing and beginning somewhat distad of the proximal margin of the infuscation. No basal nerve but the ciliation extends a half way to the base of the wing (more or less) except caudad; from the apex of the submarginal vein, a wide, oblique (caudo-proximad), naked path occurs upon the proximal half of the bend of the sub-marginal vein, three-fourths or more the way across and bordering the proximal margin

of the main infuscation. Ciliation dense as also in the costal cell except proximad widely.

Segments Nos. 1-5 of the funicle square; first ring-joint shorter than the second. Clothing of the flagellum stiff, scattered and not long. Funicle segments shortening in succession to some extent, especially in the male. Scutellum convex, longer than wide, its sculpture finer and more longitudinal. Longish black hairs upon the callus or dorso-lateral aspect of the propodeum. Hind femora simple, with longish soft hairs. Clothing of the dorsal thorax not conspicuous but present. Hind wing with about sixteen lines of dense ciliation. Spiracle circular.

The male coxae were not seen.

The collector of this new form, characterised especially by the low insertion of the antennae, wrote concerning it that it was very interesting to him, and "I have only just bred a limited number from galls on the leaves of turpentine, about a hundred small galls upon each leaf, one insect in each gall. A general examination of the adult and also the form of its egg, leads me to think that it comes somewhere near to the *Trichilogasters* which cause galls upon the *Acacias*. There is no reference to this species in any of the publications we have, and you will doubtless know if it has been described."

He gave a rough outline drawing of the egg which resembles that formerly described for *Trichilogaster*, and later promised to illustrate it, that is, the adult and gall. The species is named for Ulysses Aldrovandi, 1602.

The types are deposited in the Queensland Museum, together with the following two species received at the same time.

Though classed with the *Miscogasteridae* rightly, this genus is doubtless another of those gall-forming chalcids, hitherto unclassified correctly and grouped more or less closely together on account of habit. However, in my monograph of the Australian Chalcidoidea, now in MS. in the Queensland Museum, I have classed these rightly into their various families.

A male, three females from leaf-galls on *Syncarpia laurifolia*, Sept. 9, 1938, Newcastle, N.S. Wales, N. S. Noble, types.

GENUS EPIMEGASTIGMUS GIRAULT

Epimegastigmus darlingi Girault, nov.

Named for Grace Darling, a brave young life-saver.

Lateral ocellus distinctly closer to the median than to the eye, as far from the eye as from each other, twice farther apart than far from the median, occiput margined above. In the general diagnosis of the genus in widest sense, runs to *fulvipes* (the spiracular sulcus is black); then to *maculatipennis*, but the dorso-lateral groove is also black and there is a median groove upon the scutellum. In *fulvipes*, the lateral grooves of the scutellum are present (the ovipositor is distinctly longer here, nearly as long as the body). *Maculatipennis* is grooveless (scutellum) and distinctly smaller and lacks the black dorso-lateral groove (propodeon) or sulcus.

Mercatori bears a distinctly shorter ovipositor, three grooves upon the scutellum and the dorso-lateral groove (propodeon) is concolorous: also the size is a half smaller, the second wing with only ten lines of discal cilia to the other's fourteen; the neck of the stigmal vein is longer than wide here but in *mercatori* square. The sulci of the propodeum are not black in *maculatipennis*; nor is there any black upon the pro- and mesoventer. The species *fulvipes* bears a black triangle upon the proventer, the meson of the mesoventer is widely black (but distad less widely). In this new species, only the base of the triangle, or all of it, faintly, the mesoventer's ventral median line black only narrowly.

The species *herndoni* is flavous, bears no grooves upon the scutellum, the lateral ocelli are equidistant (apparently), (at least one or more abdominal bands), and is a half smaller. From *limoni*, this species differs in that the ovipositor and the body are somewhat longer; the flagellum, the pedicel above except at the apex, and the scape at the apex above widely, are black; the first funicle joint is distinctly longer, distinctly exceeding the pedicel (equal in the other, *limoni*); the dorsal thoracic sutures are not black; in *limoni*, according to its description, the scutellum is trisulcate, but I could not confirm this, and only the median groove was re-seen, which I think is the correct interpretation of this species. Its so-called variety, however, *morleyi* bears the three grooves.

The basal nerve bears six larger cilia, these smaller than the large submarginal vein's bristles (8); nine similar cilia continue (towards base after junction with the cubital nerve); the basal vein is chitinous, crossing the cubital as usual and curved distad. Third mandibular

tooth widely truncate (both sides). Seventh funicle a third longer than wide.

Black as follows: Upper occiput, antennae as above, cephalic margin of the scutum and propodeum, spiracular and dorso-lateral sulci of the propodeum; a spot each side of the median line of the propodeum toward apex (foveum), apex of the axilla (distal end), median line of the venter of the meso-thorax, base of the middle coxa cephalad (continuously), same very narrowly of the fore coxa; two abdominal bands (across), the second at middle; and a dorso-lateral stripe to the apex from the second cross-band. The first cross-band of the abdomen is between the second and the base, both bands interrupted at the meson; ovipositor valves. Metatarsus longer than with *limoni*, over three times longer than wide, much exceeding the longer one of the hind tibial spur.

The collector and rearer of this species has written to me that this species does not destroy the gall-former, *Trichilogaster* (called by him *acaciae-longifoliae*, though I think this is doubtful, maybe), until the latter has pupated.

The type material was reared from flower-galls on *Acacia florabunda*, Botanic Gardens, Sydney, Nov. 27, 1937 (two type females); a cotype female from the same tree, same gall, Dec. 8, 1936; and a cotype female from the same, Killara, Dec. 28, 1937.

In the above description, comparisons were with types of the species mentioned.

GENUS AMONODONTOMERUS GIRAULT

Amonodontomerus noblei Girault, nov.

From the species *poeta*: Thrice larger, the ovipositor somewhat longer, equal to the abdomen, the propodeon with a median carina, the pronotum longer and with at least one more row of setigerous punctures; the scutum is setigerous (segment No. 2 of the abdomen is twice the length of No. 3 and equal to the large No. 4, as in the other species); and so forth. The scape is red. Runs in my modernised tables, to the species *fulgens*, except that the hind femur is metallic, but it is twice larger (but not always so), the ovipositor is equal to the abdomen, and therefore is twice longer, there is one or two rows more of setigerous punctures upon the pronotum, the vertex and the upper occiput is much more hairy, the first joint of the funicle is somewhat longer than wide,

the second is equal to it but stouter, the scutum is setigerous, and both the pedicel and the scape are longer. The species is almost as large as the Apple-seed Chalcid (*Syntomaspis*), yet contrarily much exceeds *Syntomaspis d'arci* Gir. (types).

The upper thorax is cross-striate: Mesonotum very finely but less cross-wise upon the scutellum, inclining there to reticulation; the pronotum very finely. Propodeon between the sulci along the meson very finely shagreened. Only the scutum is generally setose; and the finely cross-striate pronotum, scutellum with at least three bristles upon each side, the distal at the cross suture, distad of this part, scutellum glabrous. Head all glabrous except the finely, circularly, striate occiput and near the mouth from each side. Coxae and the hind femora aeneous, but the femur not heavily so. Lateral ocellus closer to the eye than to the median. Abdomen glabrous, the petiole wider than long. Pedicel at base above metallic. Fifth funicle segment twice wider than long, shorter than the first club joint. The venation is darker than with *fulgens*, but there is the same break at the apex of the submarginal vein, the same small marginal vein's bristles (somewhat coarser than the main discal ciliation), and the same elongate submarginal vein's bristles; no basal nerve but the same naked, rounded, middle area opposite to the base of the bend of the submarginal vein, and from this three lines of large (larger) discal cilia running to the base or nearly, and in the cephalic half of the wing or thereabouts. The costal cell bears distad, one more line of ciliation, and the stigmal knob is larger in this species in reference to the comparatively slender neck. Submarginal bristles, shorter distad.

Metatarsus distinctly the longest of the segments (of the hind tarsus), five or six times longer than wide, ventrad twice the length of the longer hind tibial spur which, in turn, is twice the length of the smaller spur.

The types distinctly exceed that of *arboreus* (by three times), and also those of *megastigmoides* and *beerwahi* almost by as much; they are as large as that of *Megastigmus* (sens. lat.) *bisculus*, exceeding that of *maculatipennis*. The under wing bears twenty lines of ciliation, the hind fringe not long.

The species is named in honour of Mr. N. S. Noble, an entomologist of Sydney, for his work upon insects

other than pests. Two females reared by Mr. Noble from the flower-bud galls of *Acacia florabunda* caused by *Trichilogaster*, Botanic Gardens, Sydney, Nov. 27, 1937.

SOME NOTES ON DENDROBIUM PHALAEENOPSIS (Cooktown Orchid)

By G. Bates, Cairns.

(Paper read before the members of the Queensland Orchid Society by whose permission it is now reproduced).

You are all familiar with *Dendrobium Phalaenopsis*, which makes such a pretty picture with its raceme of mauve flowers, but how many of you have been privileged to see this fine Dendrobe in its native habitat during the flowering season.

This was a pleasure experienced by me during a recent trip to the country west of Cooktown, and it was a sight never to be forgotten. *Dendrobium Phalaenopsis* is known throughout North Queensland as the "Cooktown Orchid," because it is common in the Cooktown district, but it is, however, found in many other localities. My data is incomplete, but I have specimens from Leura, 67 miles west of Cooktown, Maytown, which is 45 miles south-west of Leura, and from the Mitchell River district, 60 miles north of Chillagoe. How far North on Cape York it extends is a matter for speculation.

Leaving Cairns per launch one morning we arrived in Cooktown, nearly a hundred miles away, just before dark, after a trip rich in beauty. The course lies close to land and one cannot fail to cogitate on the desirability of exploring the almost uninhabited country along the coast, in search of orchids. But this must wait until another time, as it is *Dendrobium Phalaenopsis* we are out to see this trip—so on to Cooktown.

Cooktown is a ghost town. The failure of the Palmer Goldfields reduced the district population from 60,000 to a few hundreds. The town itself, with its fine buildings, once a hive of industry, has now only thirty per cent. of the remaining shops occupied. Nevertheless, it is a very beautiful place, with a superb climate and a reputation for the quality of its citrus fruits.

The railway line, which extends west of Cooktown to Leura, a distance of sixty-seven miles, was built to serve

the goldfields, and before daylight the next morning we boarded the rail motor "Endeavour" and headed out into the hills. A couple of hours later we were met at the line by friends with pack horses and saddle hacks, and then followed a long day's ride into the hills.

The country is hilly, carrying Bloodwood, Stringy Bark, Ironwood, etc., and is what we term forest country, with grass at present six feet high—splendid cattle country. Scrub was to be found along the rivers mostly, and the infrequent patches of scrub on the hills is different to the rain forests of North Queensland, and more will be said about them later. Game was plentiful—turkeys, pigs, geese, ducks, and pigeons are all to be seen, while good fishing is to be had in the rivers. For those who desire crocodile shooting, this is to be had by following the rivers towards the mouth.

Towards nightfall we pitched camp at the foot of a mountain showing a large patch of scrub, and it was here we expected to see *Dendrobium Phalaenopsis*. We had ridden all day and had only seen *Cymbidium canaliculatum* in the forest and no orchid species at all in the scrubs along the river.

Those of you who are not familiar with North Queensland are inclined to consider it a climate of big rainfall, and judged by Innisfail and Tully standards, with their precipitation of over two hundred inches per year, so it is. There are, however, "dry belts" and it will come as a surprise to many to learn that *Dendrobium Phalaenopsis* grows in comparatively dry country, receiving an annual rainfall of forty to forty-five inches, and in places much less. Most of this forty inches falls in the first three months of the year and is followed by long dry spells. As I mentioned previously, it is mostly "forest country," the "scrubs" being found on the tops and sides of mountains and it is in these scrubs that *Dendrobium phalaenopsis* flourishes.

It is not "scrub" as we are wont to use the term in North Queensland, but a low, open scrub that can be easily walked through. The common North Queensland variety is jungle, or, strictly speaking, "rain forest," and although I noted several trees which grow in the Cairns district (including stinging tree) most of the scrub flora was new to me. The contour of the country was rough, with huge outcrops of granite boulders where only a mountain

goat would feel at home. In these scrubs the orchids were growing in profusion—mainly on low shrubs or bushes, the commonest one being known locally as “Quinine Bush” (Specimen No. 1). This is a different plant to what is known as Quinine Bush in other parts of Queensland, although similar. The other shrub (Specimen No. 2) is very similar in appearance to the Quinine Bush, but having the older branches with a smooth mottled bark, similar to the Guava stem. The leaves are small, like the Quinine Bush.

The Government Botanist is unable to identify the plants without flowering specimens, but says they are Myrtaceous plants, like small leaved *Eugenia* or *Myrtus*. Occasionally, plants were found growing on rocks, but this was the exception rather than the rule. Mostly they were growing low down and I only saw one plant above twenty feet from the ground. A most noticeable fact was the thin branches on which the orchids were growing; some of them as thin as a pencil. They were very plentiful, growing mostly singly, and not in clusters, as we sometimes find *D. undulatum* on rocks. Flowers could be seen everywhere (it was the month of April) varying in colour from light to dark mauve—the degree of light available to the plant making no difference to the colour of the flower. No white forms were seen among the thousands of plants examined.

While I noticed one raceme with three branches, invariably there was no branching of the raceme. As to the size of the plants, observations showed that the smallest in flower had pseudo bulbs six inches long, and the largest thirty-six inches. The majority, however, were small, a plant with bulbs eighteen inches high being a big specimen.

One fact struck me rather forcibly. The only other orchid found in these scrubs was the Pencil Orchid (*D. teretifolium*) and rarely were they found on the same tree as *D. phalaenopsis*. The latter were invariably on one of the two bushes previously mentioned, on which I never saw *D. teretifolium*, and only once did I see *D. phalaenopsis* on the same tree which was host to *D. teretifolium*.

Riding back along the creeks I did notice *D. phalaenopsis* on *Leichhardt* tree, *Pandanus* sp., Milk tree (*Alstonia*), and also on a tree (probably a *Myrtus*)

common along every scrub creek in North Queensland. But these, in my opinion, were strays. The plant before you as specimen No. 1, a species of *Eugenia*, is the main host, and everywhere it grows there will be found *Phalaenopsis*.

The *Dendrobium* beetle, *Stethopachys formosa*, was found attacking orchids in their native state, and a white scale (common in bush houses in Cairns) was also noticed on one or two plants. But generally speaking, they were remarkably clean.

I trust that these notes, incomplete as they are, describing the conditions under which *D. phalaenopsis* grows naturally, will be of some interest and may possibly be of some assistance to those who cultivate this species. They grow here either in sunlight or shade, and do very well on tree fern slabs, providing dead fern tree is used, and then only the butt portion.

Frangipanni and Custard Apple trees make good hosts, but outstanding of all is the Citrus. *D. phalaenopsis* placed on citrus trees will outgrow and outflower plants grown by any other method; particularly if the citrus trees have been neglected and have a moss-covered (but not scale-covered) bark.

THE QUEENSLAND NATURALIST

JOURNAL OF THE QUEENSLAND NATURALISTS' CLUB
AND NATURE-LOVERS' LEAGUE

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VOL. XI

AUGUST 1941

No. 7

PROCEEDINGS.

EVENING MEETING, 21st OCTOBER, 1940.

The chair was occupied by the President (Mr. H. E. Young) and 55 members were present. Misses North, Oldfield and Stark were elected members of the Club. Mr. J. E. Young gave a report on the birds seen in the excursion to the Sandgate Lagoons; these included the lesser golden plover, sand-piper, stilt, jacana, black swan and blue-billed duck. The principal business of the meeting was a lecture by Mrs. H. Curtis on the "Birds of Tamborine Mountain." Mrs. Curtis, who is a keen photographer and widely known in natural history circles for her knowledge of the wild life of the mountain, illustrated her remarks by a very fine series of lantern slides. Exhibits were tabled by Messrs. J. E. Young, H. E. Young and C. T. White.

EVENING MEETING, 18th NOVEMBER, 1940.

The chair was occupied by the President (Mr. H. E. Young) and 47 members were present. Reports on the excursion to Mt. Coot-tha were given by Mr. G. H. Barker (Birds) and Mr. S. T. Blake (Botany). The principal business of the meeting was a lecture by Mr. J. H. Simmonds on "Rural Life in the Tropics." The lecture was illustrated by lantern slides from photographs taken by the speaker in Egypt, Palestine, India and the Dutch East Indies. The rural industries of the various countries were vividly described. Several specimens of native orchids in flower from plants in his collection were shown by Mr. J. E. Young.

ANNUAL MEETING, 17th FEBRUARY, 1941.

The chair was occupied by the Vice-President (Mr. J. H. Simmonds) and 44 members were present. Mrs. Dafter and Miss Harding Frew were elected members. Mr. David G. Stead forwarded to the Club's library a copy of his "Giants and Pigmies of the Deep" and offered a number of copies free to members who made application. The

annual report, read by the Honorary Secretary (Miss E. N. Baird), showed that the Club's activities had been well maintained during the year. The membership roll stood at 133. The Hon. Excursion Secretary (Mr. G. H. Barker) gave a brief resume of the outdoor activities of the Club during the year. The report of the Hon. Librarian (Mrs. G. L. Jackson) showed that approximately 200 publications had been added to the library by purchase and exchange. The financial statement, read by the Hon. Treasurer (Miss E. N. Marks) showed a credit balance of £55/8/6. Office-bearers were elected as set out on the inner page of the front cover of this issue. The incoming President (Mr. S. T. Blake) then took the chair. In the absence of the retiring President, the reading of the presidential address was postponed, but a lecture on "Big Trees," illustrated by lantern slides of Australian and American trees and their fossil ancestors, was given by Dr. D. A. Herbert. Exhibits of shells were tabled by Miss Carrick, and nest of a trap-door spider built on wood and having two doors by Mr. Colin Geissmann.

EVENING MEETING, 17th MARCH, 1941.

The President (Mr. S. T. Blake) occupied the chair and 50 members were present. Miss C. Carnegie, Miss D. Tabrett and Mr. R. V. S. Smythe were elected members. Reports on the excursion to Camp Mountain were given by Dr. E. O. Marks (geology), Mr. S. T. Blake (botany), and Mr. G. H. Barker (birds). Mr. H. E. Young gave an interesting address on "Mycorrhiza," and showed the important role these fungal growths played in Queensland forestry practice. The lecture was illustrated by both field and micro-photographs taken by the speaker. Exhibits tabled included: Shells from Egypt from Pte. Ken Jackson, of the A.I.F.; fungus specimens by Mr. J. E. Young; photographs of Running Creek by Mr. S. T. Blake; a lizard with two tails by Mr. E. F. Riek, and a specimen of the Mollucca Balm (*Moluccella laevis*) by Mrs. Dafter.

EVENING MEETING, 21st APRIL, 1941.

The chair was occupied by the President, and 40 members were present. Miss M. Foote and Mr. J. G. Shaw were elected members. A packet of magazines were received for distribution from Mr. David G. Stead, Sydney, Hon. Secretary of the Wild Life Preservation Society.

Reports on the Easter excursion to Mt. Gipps were given by Dr. E. O. Marks (geology), Mr. S. T. Blake (botany), Mr. N. Jack (birds), and Mr. E. F. Riek (general zoology). Exhibits were shown by Miss E. N. Marks of a velvet mite from Mt. Gipps; by Miss Williamson of some land shells, and by Mr. J. E. Young of a stone axe and scraper.

EVENING MEETING, 19th MAY, 1941.

The chair was occupied by the President (Mr. S. T. Blake) and 46 members were present. Misses C. Wilson and T. Blomgren and Mr. R. McLean were elected members of the Club. The principal business of the meeting was an address on Tibet by Mr. J. Hanson Lowe. Reports on the excursion to Tamborine Mt. were given by Dr. E. O. Marks (geology), Mr. S. T. Blake (botany), and Mr. G. H. Barker (birds).

EVENING MEETING, 27th JUNE, 1941.

The chair was occupied by the President (Mr. S. T. Blake) and 52 members were present. Misses B. Ford, J. Gemmel and M. Leitch and Mr. E. T. Holdaway were elected members of the Club. Reports on the excursion to Caloundra were given by Mr. S. T. Blake (wild flowers), Mr. G. H. Barker (birds), and Mr. E. F. Riek (marine zoology). The principal business of the meeting was a lecture by Mr. F. A. Parkins, of the Biology Department of the Queensland University, on "Butterflies and Moths of the Brisbane District." Mr. G. H. Barker showed specimens of native orchids collected from fallen timber near the New South Wales border (*Sarcochilus* and *Bulbophyllum*, spp.).

QUEENSLAND NATURALISTS' CLUB ANNUAL REPORT FOR THE YEAR ENDING JANUARY 31st, 1941.

Ladies and Gentlemen,

The Council of the Queensland Naturalists' Club has pleasure in presenting the thirty-fifth annual report of the Club's activities.

The year has been a full one, and natural history pursuits have been carried forward enthusiastically during the meetings and excursions.

MEETINGS.—There have been ten evening meetings which were held monthly, except during the mid-winter recess. Ten field excursions and ten Council meetings have also taken place. Attendance at the Council meetings has been as follows:—Mr. H. E. Young, 9; Mr. S. T. Blake, 10; J. H. Simmonds, 6; Miss E. E. Baird, 10; Miss H. F. Clarke, 6; Miss E. N. Marks, 3; Mrs. G. L. Jackson, 3; Mr. G. H. Barker, 10; Mr. W. J. Sanderson, 6; Mr. C. T. White, 8; Mr. J. E. Young, 7; Dr. E. O. Marks, 10; Dr. D. A. Herbert, 6; Dr. W. H. Bryan, 4; Mr. G. L. Jackson, 7. The Hon. Treasurer (Miss Clarke) was transferred by her employers to Mackay, and had perforce to relinquish her position as an office-bearer of the Club. Miss E. N. Marks kindly consented to carry on the duties of the position for the remainder of the year. The attendance at the evening meetings has been good, the average number of members and friends present being 40. Interesting and instructive lectures and papers dealing with various branches of natural history have been given and read during the year. Many were illustrated by lantern slides, and in nearly all cases exhibits illustrating the subject matter of the addresses were tabled. The lecturers included Messrs. A. R. Trist, E. W. Bick, W. G. Wells, H. W. Hermann, Dr. R. Hamlyn Harris, Mr. C. T. White, Dr. D. A. Herbert, Mrs. Herbert Curtis, and Mr. J. H. Simmonds.

The September meeting of the Club was devoted to exhibits. Much emphasis was placed on the wild flower section. Other sections included photographs, geological specimens, etc.

Reports of the monthly field excursions were given at the succeeding monthly meeting by members who acted as leaders in the various branches of natural history studied during the outing. Specimens collected were exhibited and discussed.

A considerable number of interesting exhibits were tabled at the monthly meetings by various members and commented on by those present.

MEMBERSHIP.—It is with great regret that the death of three members is recorded. Mr. B. Long, of the Grange, was well known to members; he enthusiastically attended the majority of the evening and field meetings, and the loss of his cheery personality and interested comments will be much felt. Mr. Noel Agnew, of Dunwich, was not so well known to members, as he was unable to

attend meetings; he was an energetic country member; he had been ill for some time and his passing was not so unexpected as was the sudden death of Mr. Long. Mr. J. O'N. Brennan, who died in March, had been a Club member for many years. His help and knowledge of native birds and animals was always readily given to younger members, and he is greatly missed.

Nineteen new members have been elected during the year and five resignations have been received. Some unfinancial members have been removed from the membership roll. There are now 133 members of the Club; of these 7 are honorary members, 23 country members, and 103 town members.

NATURE LOVERS' LEAGUE.—A number of membership certificates of the Nature Lovers' League have been sold by officers of the Queensland Museum staff to school children who were interested in natural history.

"QUEENSLAND NATURALIST".—Two numbers of the Club's official organ, the "Queensland Naturalist," have been published during the year, and the Editor thanks contributors and hopes for their continued support.

WAR SAVING CERTIFICATES.—The Club has expended £40 in the purchase of War Saving Certificates. The Certificates have been deposited at the Commonwealth Savings Bank in George Street and the receipt for them is being held by the Hon. Secretary.

GENERAL.—When considered necessary, action has been taken by the Club concerning reported infringements of the Animals and Birds Protection Acts and the Native Plants Protection Acts. In some cases the action taken was successful.

Appended are reports by the Hon. Librarian, the Hon. Excursion Secretary, and Hon. Treasurer.

H. E. YOUNG, President.

E. E. BAIRD, Hon. Secretary.

REPORT OF HON. LIBRARIAN FOR 1940.—About 140 magazines and 60 books have been lent during the year. American scientific pamphlets and magazines are still arriving fairly regularly. Some from Britain have temporarily ceased, as also have those from France and the European countries. There have, of course, been none from Germany since the outbreak of war.

In order to avoid congestion on our shelves, all scien-

tific or purely reference works, after passing through the Library, are being sent as a loan collection to the Biology Department of the Queensland University. They are readily available to members wishing to consult them.

The book, "Koonwarra," by Mr. Charles Barrett, has been added to the library by purchase during the year.

Dr. Malaher has presented us with a copy of "The Making of a Scientist," and Mr. J. Nebe and Mr. G. H. Barker continue to contribute magazines, and to these gentlemen we tender our sincere thanks.

E. M. JACKSON, Hon. Librarian.

QUEENSLAND NATURALISTS' CLUB

REPORT OF EXCURSIONS FOR 1940

FEBRUARY.—An afternoon visit was paid to the Botanic Gardens where, under the guidance of Mr. E. W. Bick, members were shown all the points of interest in that pleasant corner. The Bush Houses, Potting Sheds, Orchid Houses, etc., were included in the tour.

MARCH.—This should have been our major outing of the year, but on account of the very threatening weather the usual Easter Camp-Out was abandoned.

APRIL.—An afternoon outing by train to Birkdale, at which about a dozen members attended. This was mainly a Bird Outing, and covered many waders as well as the usual forest friends, the recording of a Chat being the most interesting find of the day.

MAY 4-6.—A week-end outing to Tamborine Mountain where about a dozen members had the benefit of the guidance of Mr. and Mrs. Herbert Curtis, and a rich fare of natural objects for geologists, botanists, ornithologists and others was provided. This area is perhaps the richest and most varied within reasonable distance of the city, and should become a regular hunting ground for the Club.

MAY 19.—The Club and friends were the guests of Mr. Inigo Jones, Crohamhurst, for a whole Sunday. The Observatory was inspected and short excursions to local points of interest and the foothills of the Blackall Range were made, the attendance being the best for the year.

JUNE 17.—The Club visited Closeburn in the Samford Valley this day, and the members who were under the leadership of Dr. E. O. Marks, found the district a very profitable one.

JULY 3.—Ormiston. This outing, again under the leadership of Dr. E. O. Marks, was the occasion of a visit to Miss Macartney at Ormiston House, one of the State's historic homes. The outstanding attraction for Club members was the collection of exotic trees, the more important of which was the Indian Banyan Fig,

AUGUST 10.—On this date a visit was made to Klumpp Road, Mt. Gravatt, and from there through the Cemetery to Sunnybank. Owing to the dry season very little of interest was observed.

SEPTEMBER 7 and 8.—A week-end outing to Point Look-Out, Stradbroke Island, per m.v. "Look-Out," was arranged for this date and attracted quite a big list of members. Many and varied were the interests of this outing. The trip across the Bay (which on the return was quite lively owing to the heavy seas), the many sea-birds and waders seen at different times, then the trip across the island on two or three antediluvian motor trucks, the botanical wealth of the big swamp we skirted, and then the sea and the excellent guest house at the Point, combined to make this trip the most outstanding of the year.

OCTOBER.—An old haunt, Sandgate Lagoons, which has been a "stand-by" of the Club for years and years, was also on the year's programme, though not many members were able to join in the outing. As usual water birds were observed in abundance on those lagoons, which are close Sanctuaries, and, as usual, the extraordinary spectacle of the shy Lotus Bird thoroughly at home on a lagoon bordering on a busy street in the town of Sandgate was chronicled.

NOVEMBER.—The last outing of the year was one arranged for One Tree Hill, and the Dams per bus from the Cemetery Gate. Opportunity was taken to visit the little Zoo at the Kiosk, and we were glad to be able to report that the birds and animals there are in excellent order and evidently carefully tended. The first part of our descent to the Dams was through part of the park that had been well burnt out during the year, and was very bare. Near the Dams, however, things were in much better condition, and some interesting plants and birds were recorded, a number of Drongos being the outstanding item. Also a large flock of the spine-tailed Swift was seen hawking over the top of the hill making westward towards Ipswich, against the fairly strong wind that was blowing. The flock was scattered and the birds were passing at minute

intervals all the time we were there. They were not hawking and one speculates what mission these great flying travellers were on at that time.

This outing was the concluding one of the year, and if one remembers the difficult war times we are passing through, the Club can be pleased that this feature of its activities was so successful.

GEO. H. BARKER (Hon. Excursion Secretary).

QUEENSLAND NATURALISTS' CLUB
STATEMENT OF RECEIPTS AND EXPENDITURE
FOR YEAR ENDING 31st DECEMBER, 1940.

RECEIPTS

	£	s	d
Balance forward from 1939	54	7	3
Subscriptions and Donations	53	8	10
Nature Lovers' Certificates	8	2	8
Sales of "Queensland Naturalist"		4	1
Interest at Savings Bank	1	0	0
	£117	2	10

EXPENDITURE

	£	s	d	£	s	d
Rent: Women's Club				12	5	0
Insurance: Bookcase, Library, Tent, Poles, etc.					5	0
Telephone	6	7	1			
Less Refund	1	5	1			
				5	1	11
Petty Cash				10	0	0
Barker's Bookstore :						
Magazine Subs.	1	15	0			
Book for Library		9	6			
				2	4	6
Clark & Mackay :						
Printing "Naturalist"				25	11	8
Honorarium to Hon. Secretary				5	5	0
Repairs to Tent				10	9	
Wreath				10	6	
War Savings Certificates				40	0	0
Balance in Bank				15	8	6
				£117	2	10

War Savings Certificates	..	..	£40	0	0
Bank Balance	..	..	15	8	6
Total	..	..	£55	8	6 includes
Nature Lovers' League A/c.	..	..	38	19	10
Tent A/c.	..	..	5	6	8

E. N. MARKS, Hon. Treasurer.

C. W. HOLLAND, Hon. Auditor.

MYCORRHIZAS

By H. E. Young, M.Sc.

Most people, including many biologists, think of the absorbing roots of trees in terms of agricultural plants in sand culture, i.e., with root tips and root caps and numerous root hairs for absorption purposes attached to the sides of the roots. This is, however, not even remotely the case in the majority of trees and in many other plants.

In the woodlands roots are invaded by fungi. In many trees the invaded roots become modified so as to lack root hairs and possess no direct contact with the soil. They become deeply imbedded in a compact fungal tissue called the mantle which surrounds them until their death.

The simple process of absorption of soil moisture and nutrients by root hairs is replaced by a complex system of nutrient exchange between two widely different members of the plant kingdom—a fungus and a tree. To reach the conduction tissue of the higher plant the water and nutrients must be absorbed by the fungal threads or hyphae, which branch out in the soil, and pass back along them through the bark-like mantle of fungus, and finally through or around several layers of cortical cells which are separated from one another by a continuous network of fungal hyphae called the "Hartig net." This arrangement provides a more extensive and efficient absorptive system than the root hair one, which indeed frequently does not exist in nature.

Such a structure is regarded neither as a root nor a fungus. It is a combination of both producing a distinct organ. It is called a mycorrhiza—a compound Greek term meaning a fungus root. In 1900 Stahl designated the process of plant nutrition involving mycorrhizas as mycotrophy or fungus nutrition.

These mycorrhizas are of two main types: (a) External or *ectotrophic*, in which the fungal elements are arranged in a mantle or sheath over the root as well as between the root cells, and (b) *endotrophic*, in which the fungus is internal and appears on the surface of the root as individual hyphae only, with no mantle development.

The ectotrophic mycorrhizas occur in the majority of woodland trees and in a few herbs. The endotrophic type is the more common and has been found in the majority of terrestrial plants in which they have been sought.

In *Eucalyptus* and *Pinus* is found the ectotrophic type, whilst in *Araucaria* and citrus the endotrophic form prevails.

The fact that there is some connexion between tree roots and certain fungi was noted as long ago as the third century B.C., when Teophrastus commented on the occurrence. But it was not until the nineteenth century with the development of microscopic technique that the phenomenon became more carefully studied.

One aspect of interest was the occurrence of the truffles beneath forest trees and nowhere else, and it became general opinion that there must be some symbiotic connexion between the two plants—the truffle fungus and the beech or other tree.

The truffle crop is an important one in Europe where they are eagerly sought after for marketing purposes. Trained pigs are used in hunting for them on account of their being able to locate the tubers below the soil surface by the scent. Frank, a German botanist, was engaged by the German Government in 1880 to investigate truffles so as to find some means of increasing the crop. He did not succeed in this object but showed that most trees are mycorrhizal and propounded a theory postulating the mutual benefit obtained by the fungus and tree. Most botanists of the time, including Hartig, derided Frank's ideas, but recognised the presence of fungus structures in the roots.

The fact that all the short roots in many trees were sheathed in mycelium led Frank to believe that water and nutrients entering the tree were obtained from the fungus. Much controversy occurred about this, and there were many scientists in favour of each view.

In 1887 Frank wrote another paper describing the

endotrophic or internal type of mycorrhiza such as occurs in Hoop pine.

Hartig and other botanists considered that the fungi on the roots were injurious parasites, but by 1900 he and others had modified their view. Even in modern times several people continue, without support, to consider the fungi as being in general harmful.

In 1900 Stahl advanced a theory to explain mycotrophy. This is his famous mineral salt theory. He considered that the fungi connected with the tree roots, by reason of their wide distribution in the soil acted as very efficient root hairs, and were able to supply the trees with mineral salts obtained from the soil in return for carbohydrates which were considered to be obtained from the tree.

Frank and others thought that the fungi supplied organic nitrogen to the trees as their main function besides acting as a means of transport for other soil nutrients.

In Sweden, Melin showed (1925) that not only were the fungi beneficial to the trees which he studied, but in most cases were absolutely essential for vigorous growth. He and others have carried out a considerable amount of research which has shown that particular fungi only occur in association with certain genera of trees with which they form mycorrhizas. He also disproved the idea that the mycorrhizal fungi can fix atmospheric nitrogen which they were previously thought by some botanists to supply to the trees.

Melin demonstrated that in soils where no mycorrhizal fungus existed trees always died unless an appropriate fungus was introduced. This was important in reforesting treeless country such as the heaths and moors.

Following all this investigation it has become established that the failure in growth of seedlings in many forest nurseries has been due to the absence of the requisite fungi in the soil, and with the introduction of fungi good results have been achieved. An illustration of this is in the Philippine Islands where the Benguet pine (*Pinus insularis*) which occurs on the highlands could not be grown on the coastal lowlands until soil containing the mycorrhizal fungus was carted from the hills and scattered over the nurseries on the lowlands when good growth was obtained. Another example is the case of Queensland Hoop Pine (*Araucaria cunninghamii*) in Nyasaland. There, no growth could be obtained until the nurseries

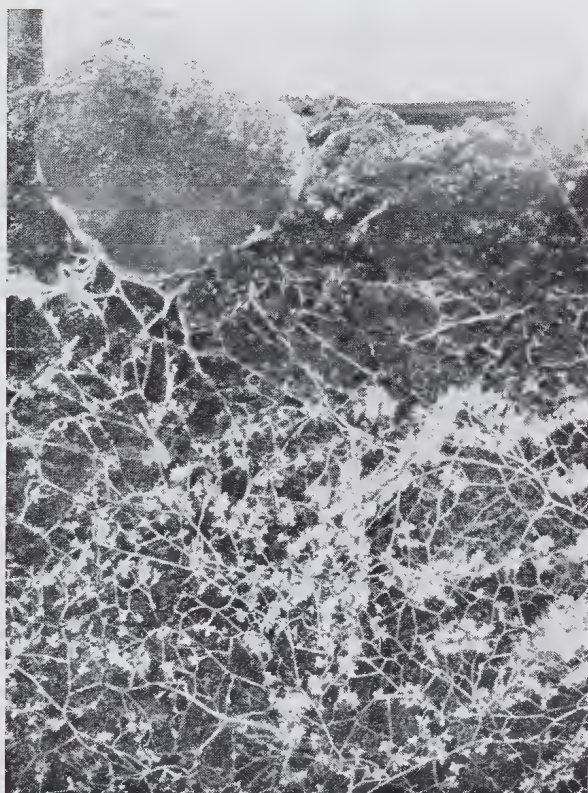
were inoculated with soil from beneath an old big tree growing in a park. In Australia similar phenomena have occurred with exotic pines such as *Pinus radiata*, *P. taeda*, etc. The establishment of the shelter belt of trees in the great plains of America has also brought up similar problems.

Orchids also are mycotrophic. In their case the mycorrhiza is of the endotrophic (internal) type. The seed of the orchid will not germinate naturally unless in contact with an appropriate fungus. The fungus in the orchid root conveys to the orchid the breakdown products of the bark or soil organic matter on or in which the plant lives. By rotting the organic matter the fungus obtains sugars and other nutrients which it supplies to the plant.

The place of the fungus in the seed germination of orchids can now be taken by nutrient media rich in sugars, etc., and on which the seed will germinate and the seedling grow. This method is in general use for the production of orchids and orchid hybrids by nurserymen. Before the discovery of the necessity for the presence of the fungus it was only by chance that any seedling orchids could be raised artificially as is the case in nature.

The growth of orchids which have no green leaves, such as our native potato orchid, *Galeola cassythoides*, and are therefore unable to manufacture sugars for themselves by the aid of sunlight, is explained by the presence of the mycorrhizal fungi which supply these substances to the plants as breakdown products of rotting vegetation.

A number of unhealthy features in tree growth have now been traced to the state of the mycorrhizal system of a tree. One of these, "fused needle disease" of species of Pine is found in various parts of the world, including England, the United States, New Zealand and Australia. In Queensland this trouble gave considerable cause for anxiety for some time and was therefore investigated. It was found to be a mycorrhizal trouble. Experiments showed that the continual addition of fresh organic matter cured the disease. Later, fertilizer experiments showed that the application of phosphatic manures was able to do the same thing more satisfactorily. It was found that the application of phosphates manured the undergrowth in pine plantations on poor soils, thus causing a greater development of weeds, etc., which contributed their quota of dead leaves, etc., to the soil surface. This leaf litter was also of richer composition due to the fertilizer. The mycorrhizal fungus



Sporophore of **Rhizopogon roseolus** in association with the roots of **Pinus taeda** in culture. Showing coraloid ectotrophic mycorrhizas and connecting mycelial strands.

(Natural size.)



HYMENOPHYLLUM WHITEI D.A. GOY.

(Part of type specimen.)

Photo Dept. of Agriculture and Stock, Brisbane.

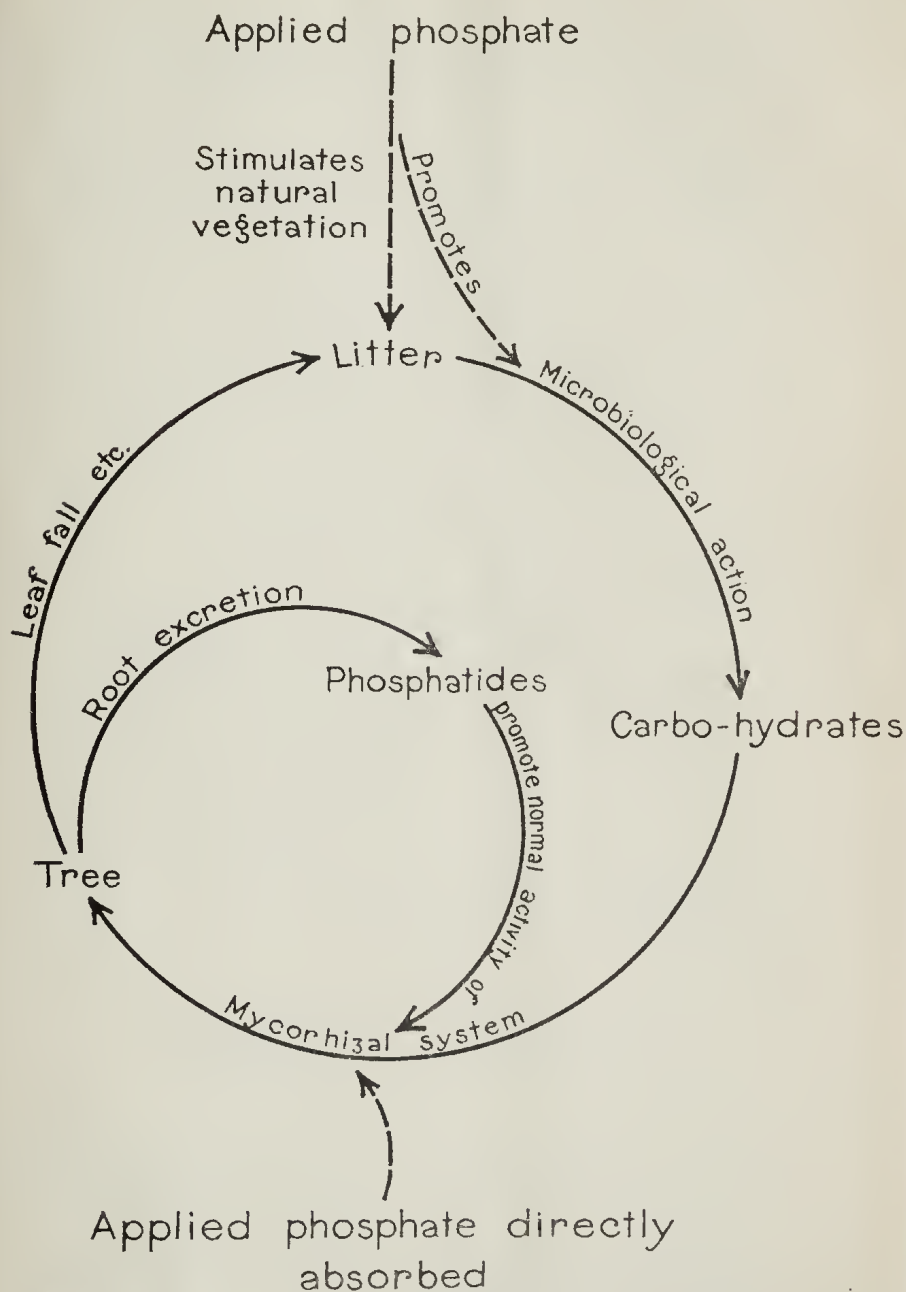


Plate. Diagrammatic representation of the effect of phosphate applications on the nutritional cycle of the pine tree.

of the pine trees was then found to be able to feed on this material and supply the tree with its needs in the way of carbohydrate and other nutrients. Diagrammatically, the use of the phosphate is shown in the accompanying figure.

Different species of pine tree require different phosphate values in the soil, therefore soil surveys and chemical analyses are now carried out in Queensland on proposed plantation sites for exotic pines, and fertilizer applications are made as necessary for the species it is proposed to plant, so as to ensure healthy growth.

The way in which trees can linger on in the rain forest as small seedlings under a heavy leafy canopy in the absence of direct sunlight is perhaps explained by their mycotrophic habit. Indeed, the subject gives rise to a wide scope of investigation along this and similar lines.

A NEW FILMY FERN (*HYMENOPHYLLUM*) FROM NORTH QUEENSLAND

By D. A. Goy.

Whilst working through the ferns collected by C. T. White and L. J. Brass from Thornton Peak, which lies a little to the north of the mouth of the Daintree River, in North Queensland, I noticed a rather small species of *Hymenophyllum*, which could not satisfactorily be placed under any previously described species from Queensland. At first it was thought to be a dwarf form of *Hymenophyllum rarum* R. Br., which occurs in south-eastern Australia and New Zealand. However, closer examination showed it to be quite different in a number of ways from that species.

The main respects in which the North Queensland fern differs from *H. rarum* R. Br. may be summed up as follows:—

<i>H. rarum</i> R. Br.	<i>H. sp. nov.</i>
Base of the sorus cuneate or wedged-shaped.	Base of the sorus truncate or straight.
Cuneate base of sorus immersed in the lobe.	Base of sorus coinciding with the end of the lobe.
Sorus subtended by prominent Y-shaped branches of the vein.	Sorus subtended by obscure T-shaped branches of the vein.
Fronds typically about 4 ins. long, sometimes more.	Fronds only 1 inch long.
Fronds many-lobed.	Fronds up to ten-lobed.

It is proposed to name the fern as a new species after Mr. C. T. White, Government Botanist, who in conjunction with Mr. L. J. Brass, was the first to collect it. In accordance with the International Rules of Nomenclature, the original description which follows is given in Latin.

Hymenophyllum Whitei sp. nov. affinis *H. raro* R. Br. sed indusio usque ad basin truncatam bipartito, frondibus minoribus, stipitibus brevissimis, segmentis primariis saepe confluentibus indivisis vel bilobatis, differt.

Rhizoma repens, elongatum, filiforme, ramosum, nudum vel parce fibrillosum; frondes sparsae, breviter stipitatae; stipites filiformes, praeter basin fibrillosam glabri, exalati, usque ad 5 mm. longi; frondes cum stipitibus 1.5—2.5 cm. longae, circa 1 cm. latae, lineari-oblongae vel ovato-oblongae, falcatae, membranaceae, pallide glaucescentes, in 5-10 segmenta profunde divisae; segmenta lineari-oblonga, plana, obtusa, indivisa vel nonnulla inaeque bilobata, lobo adaxiali circa duplo brevior solum saepe gerente; segmenta media subaequalia, circa 5 mm. longa et. 2-3 mm. lata, terminale longius, jugum infimum saepe distinctum et brevius; sori solitarii, loborum apice siti; indusium lobo plus minusve aequilatum, late ovatum vel suborbiculare, usque ad basin truncatam bipartitum, valvis late rotundatis, integris; receptaculum breve, inclusum.

North Queensland.—Thornton Peak, 19th Sept., 1937, C. T. White & L. J. Brass, No. 226, "epiphytic." (Type in Herb. Brisbane).

This species would come under the subgenus *Mecodium* as understood by Dr. E. B. Copeland in his revision of the genus *Hymenophyllum*, and is figured in the accompanying Plate.

SOME BIRDS AND MAMMALS OF THE GLASSHOUSE MOUNTAINS DISTRICT

By N. Jack.

As the above title suggests, the following list of Birds and Mammals, noted during a four months' sojourn, between August and December last year, in the Glasshouse Mountains District, does not pretend to be comprehensive. The possibilities of such an area obviously could not be exhausted in so short a time; but the following species, except where otherwise indicated, have been definitely identified, and can always be added to on any future occasion.

Beyond the identification of species there was very little opportunity to make any further observations; but the date of arrival of the springtime migrants were noted, and only served to substantiate what is already known from observations in the Brisbane area. Briefly, the migrants from the North arrive a week or so earlier than is the case of the Brisbane area. The Rose Robin and Spinebill were just about to leave when I arrived in August. The Yellow-faced Honeyeater and Grey Fantail, winter migrants in Brisbane, appear to be permanent residents. The Forest Kingfisher was already there when I arrived, but the Sacred Kingfisher arrived with the other springtime migrants, which included the migratory Flycatchers, the Dollar Bird, Fairy Martin, Wood Swallows, Cicada Bird, Drongo, Swift, Rufous Whistler, the various species of Cuckoo, Snipe, Stubble Quail and the Lorikeets, Honeyeaters and swamp-loving birds (Ibis, Herons, etc.), which appear to be nomadic in habit.

Such secretive birds as the Banded Landrail, Australian Snipe, Owlet Nightjar (Nesting), white-throated Nightjar, and Spotted Quail-Thrush were all good finds. The appearance of a solitary Jacana in a small stream running through a clearing between heavily timbered country, seems to suggest that that species is nomadic in habit, and also serves as a gentle reminder never to dogmatise on habitat.

The raucous cry of a Channel-bill Cuckoo passing over early one morning; the appearance of a flock of Spine-tailed Swifts; a Noisy Pitta calling at night; the early morning chorus which, contrary to general belief, was always started by Jacky Winter, closely followed by the Yellow Robin, Kookaburra, Pied Butcher Bird, Grey Thrush, Whip Bird, and Golden Whistler, to mention just a few; the frequent occurrence of the Spectacled Flycatcher; the paucity of Silvereyes, such a common bird in the Brisbane area: the finding of a dozen species of Honeyeater, including the unusual yellow-tufted and the vivacious white-checked, with our common white-naped being very hard to find, are only a few of the many incidents which contributed to a list of over a hundred species.

The Mammals were a harder task, some remaining unidentified. The Koala was seen once and heard twice. One Kangaroo and four Wallabies were noted, Echidnas were seen on several occasions, and the Platypus is domiciled in the Stanley River. A small but interesting mar-

supial was the Brush-tailed Phascogale. The finding of a colony of Flying Foxes, which must have run into thousands, was another outstanding, if rather unpleasant, incident. The Dingo, Fox, Native and Domestic Cat must make life very precarious for the other forms, added to the fact that the district appears to have been well "shot over."

BIRDS

- Scrub Turkey (*Alectura Lathamii*)
 Stubble Quail (*Coturnix pectoralis*)
 Topknot Pigeon (*Lopholaimus antarcticus*) D
 Red-crowned Pigeon (*Ptilinopus regina*)
 Brown Pigeon (*Macropygia phasianella*)
 Peaceful Dove (*Geopelia placida*)
 Bar-shouldered Dove (*Geopelia humeralis*)
 Green-winged Pigeon (*Chalcophaps chrysoclora*)
 Wonga Pigeon (*Leucosarcia melanoleuca*)
 Bronzewing (*Phaps chalcoptera*)
 Banded Landrail (*Hypotaenidia phillipensis*)
 Spur-winged Plover (*Lobibyx n-hollandiae*)
 Australian Snipe (*Gallinago hardwicki*)
 Jacana (*Ircidiparra gallinacea*)
 Stone Curlew (*Burhinus magnirostris*)
 White Ibis (*Threskiornis molucca*)
 Straw-necked Ibis (*Threskiornis spinicollis*)
 Egret (*Egretta alba*)
 White-faced Heron (*Notophoyx n-hollandiae*)
 White-necked Heron (*Notophoyx pacifica*)
 Nankeen Night Heron (*Nycticorax caledonicus*)
 Black Duck (*Anas superciliosa*)
 Grey Goshawk (*Astur n-hollandiae*)
 Wedge-tailed Eagle (*Uroaetus audax*)
 Peregrine Falcon (*Falco peregrinus*)
 Nankeen Kestrel (*Falco cenchroides*)
 Boobook Owl (*Ninox boobook*)
 Rainbow Lorikeet (*Trichoglossus moluccanus*)
 Scaly-breasted Lorikeet (*Trichoglossus chlorolepidotus*)
 Little Lorikeet (*Glossopsitta pusilla*)
 Red-tailed Black Cockatoo (*Calyptrorhynchus funereus*)
 White Cockatoo (*Kakatoe galerita*)
 King Parrot (*Aprosmictus scapularis*)
 Crimson Rosella (*Platycercus elegans*)

Pale-headed Rosella (*Platycercus adscitus*)
Tawny Frogmouth (*Podargus strigoides*)
Owlet Nightjar (*Aegotheles cristata*)
Dollar Bird (*Eurystomus orientalis*)
Azure Kingfisher (*Alcyon azurea*)
Kookaburra (*Dacelo gigas*)
Sacred Kingfisher (*Halcyon sanctus*)
Forest Kingfisher (*Halcyon macleayi*)
Rainbow Bird (*Merops ornatus*)
White-throated Nightjar (*Eurostopodus mystacalis*)
Spine-tailed Swift (*Hirundaneus caudaculus*)
Pallid Cuckoo (*Cuculus pallidus*)
Fantail Cuckoo (*Cacomantis flabelliformis*)
Golden Bronze Cuckoo (*Lamprolaima placosus*)
Channel Bill (*Scythrops n-hollandiae*)
Koel (*Eudynamis orientalis*)
Pheasant Coucal (*Centropus phasianinus*)
Noisy Pitta (*Pitta versicolor*)
Welcome Swallow (*Hirundo neoxena*)
Tree Martin (*Hylochelidon nigriceps*)
Fairy Martin (*Hylochelidon oriel*)
Jacky Winter (*Microeca fascians*)
Rose Robin (*Petroica rosea*)
Gay Fantail (*Rhipidura flabellifera*)
Rufous Fantail (*Rhipidura ruficeps*)
Willie Wagtail (*Rhipidura leucophrys*)
Leaden Flycatcher (*Myiagra rubecula*)
Restless Flycatcher (*Seisura inquieta*)
Black-faced Flycatcher (*Monarcha melanopsis*)
Spectacled Flycatcher (*Monarcha trivirgata*)
Yellow Robin (*Eopsaltria chrysorrhoa*)
Golden Whistler (*Pachycephala pectoralis*)
Rufous Whistler (*Pachycephala rufiventris*)
Grey Thrush (*Colluricincla harmonica*)
Magpie Lark (*Grallina cyanoleuca*)
Spotted Quail Thrush (*Cinclosoma punctatum*)
Whip Bird (*Psophodes olivaceus*)
Grey-crowned Babbler (*Pomatostomus temporalis*)
Black-faced Cuckoo Shrike (*Coracina n-hollandiae*)
Cicada Bird (*Edolisoma tenuirostre*)
White-throated Warbler (*Gerygone olivacea*)
Brown Thornbill (*Acanthiza pusilla*)
Striated Thornbill (*Acanthiza lineata*)
Yellow-tailed Thornbill (*Acanthiza chrysorrhoa*)
Fantail Warbler (*Cisticola exilis*)

- White-browed Scrub Wren (*Sericornis frontalis*)
Variegated Wren (*Malurus Lamberti*)
Red-backed Wren (*Malurus melanocephalus*)
White-breasted Wood Swallow (*Artamus leucorhynchus*)
Dusky Wood Swallow (*Artamus cyanopterus*)
White-throated Tree Creeper (*Climacteris leucophaea*)
Mistletoe Bird (*Dicaeum hirundinaceum*)
Black-headed Pardalote (*Pardalotus melanocephalus*)
Silvereye (*Zosterops lateralis*)
White-naped Honeyeater (*Meliphaga lunata*)
Scarlet Honeyeater (*Myzomela sanguinolenta*)
Spinebill (*Acanthorhynchus tenuirostris*)
Brown Honeyeater (*Glyciphila indistincta*)
Lewin Honeyeater (*Meliphaga lewini*)
Yellow-faced Honeyeater (*Meliphaga chrysops*)
Yellow-tufted Honeyeater (*Meliphaga melanops*)
White-cheeked Honeyeater (*Meliornis niger*)
Noisy Miner (*Myzantha melanocephala*)
Brush Wattle Bird (*Anthochaera chrysoptera*)
Blue-faced Honeyeater (*Entomyzon cyanotis*)
Noisy Friar Bird (*Philemon corniculatus*)
Pipit (*Anthus Australis*)
Double-bar Finch (*Steganopleura bichenovii*)
Chestnut-breasted Finch (*Donacola castaneoethorax*)
Red-browed Finch (*Aegintha temporalis*)
Oriole (*Oriolus sagittatus*)
Figbird (*Specothes vieillotii*)
Drongo (*Chibia bracteata*)
Satin Bower Bird (*Ptilonorhynchus violaceus*)
Green Cat Bird (*Ailuroedus crassirostris*)
Regent Bower Bird (*Sericulus chrysocephalus*)
Raven (*Corvus coronoides*)
Pied Currawong (*Strepera graculina*)
Pied Butcher Bird (*Cracticus nigrogularis*)
Grey Butcher Bird (*Cracticus torquatus*)
Magpie (*Gymnorhina tibicen*)

MAMMALS.

- Grey-headed Fruit-Bat (*Pteropus poliocephalus*)
Dingo (*Canis dingo*)
Grey Kangaroo (*Macropus giganteus*)
Black-tailed Wallaby (*Macropus ualabatus*)
Red-necked Wallaby (*Macropus ruficollis*)
Black-striped Wallaby (*Macropus dorsalis*)

Parry's Wallaby (*Macropus porryi*)
 Pygmy Flying Phalanger (*Acrobates pygmaeus*)
 Short-headed Flying Phalanger (*Petaurus breviceps*)
 Greater Flying Phalanger (*Petauroides volans*)
 Ringtail Possum (*Pseudochirus laniginosus*)
 Silvey Grey Possum (*Trichosurus vulpecula*)
 Koala (*Phascolarctus cinereus*)
 Short-nosed Bandicoot (*Isoodon obesus*)
 Brush-tailed Phascogala (*Phascogale penicillata*)
 Echidna (*Tachyglossus aculeatus*)
 Platypus (*Ornithorhynchus anatinus*)

Also the introduced Fox, Hare, and Domestic Cat. A small Wallaby of the Pademelon type, a Kangaroo Rat, and Native Cat (*Dasyurus*) remain for the present unidentified.

A NEW GENUS OF QUEENSLAND CHALCIDOIDEA.

By the Late A. A. Girault, B.Sc.

The following new genus of Chalcidoidea (*Hymenoptera*) is near a number of relatives of *Isodromoides* and so forth; and was reared, or rather collected from a borer-infested tree of *Acacia*, December 5, 1939. Indooroopilly, type. Two more females were taken at 3.30 p.m., Dec. 22, 1939. The second female was a bit larger than the type; the third smaller than it.

Pseudencyrtella has the scape over the elypeus, the club solid, six joints of the funicle, the marginal vein longer to *Isodromoides* but the venation is different, the postmarginal and the marginal veins subequal, the stigmal longer than the postmarginal. The frons is moderately wide. Much exceeding the minute type of *Anagyrus hegei* and *Kakooburra fera*; and exceeding the moderate sized type of *Hexencyrtus fumosipennis* (which is over twice longer than the *hegei*, and equals the type *Paracedella giorgioniei*.

The species is about a third larger than the type of *isodromoides triangularis*; and somewhat larger than the specimens of *Paramusia longiscapus* which are stouter than the *Isodromoides* and about half the length of specimens of *Eupelmus blattidifurax*. *Austroencyrtus* has the scape much extended above the vertex, the ovipositor long. *Zamenhofella* new genus.

Two rows of fine punctures extend along the frons to the semi-circular serobicular arch (the latter extending not half-way up the eyes) behind the lateral ocelli; on the lower face (but not on the genae, the euture present) umbilicately punctate. The antennae are a bit below the eyes, the latter exceeding the cheeks distinctly and naked; lateral ocelli at the eyes or nearly, more apart than close to the cephalic, the frons moderately wide. A long earina between the antennae.

Head somewhat longer than wide. Marginal vein twice longer than wide (over), shorter than the rather long postmarginal vein or subequal; the stigmal longest, a third longer, with a long (a bit) curved neck, much exceeding the curved stigma which is $2\frac{1}{2}$ longer than wide and gradual. Palpi 4-3-jointed, No. 2 of the labial and No. 3 of the maxillary much shortest. Mandibles 3-dentate, teeth Nos. 2 and 3 paired. Ovipositor somewhat extruded, free; 4-5 lines of cilia proximad of the hairless line, grouped into two parts more or less from cephalad. *Zamenhofella voltai* new species.

Dark aeneous green, the wings clear, the venation yellow-brown; the following part of the legs red-brown—the middle legs except the coxae, all the knees widely, all the tarsi except joint No. 5. A colourless break is at the apex of the submarginal vein. The first funicle segment exceeding the pedicel, over four times longer than wide, equal to funicle joint No. 2. Joint No. 6 of the funicle shortest, over twice longer than wide, shorter than the club, the latter equal to the pedicel, the funicle closely hairy. Joint No. 3 of the maxillary palpus, No. 2 of the labial shortest; No. 4 of the outer palpus, much the longest of all (both palpi). Scutum, scutellum pilose from minute punctures. Scape slender, ventrad a linear exfoliation all along.

Discal ciliation of the fore wing very fine and dense (both wings), the posterior wing with 26 lines of cilia, blunt at apex. Metatarsis three times longer than wide, longest but not half of the tarsus length (leg No. 3). Tibial spur stout and long (leg No. 2). Submarginal bristles slender and long. Distal part of the two groups of discal cilia proximad of the hairless line, 2 lines; 4-5 lines of ordinary cilia (as in the main ciliation), in the costal cell but only one is distad (cephalic margin) for a long distance. Proximal cilia of the hairless line much

exceeding the main ciliation but smaller than the submarginal bristles.

Dedication to Count Volta of electricity fame.

Type a single female in the Queensland Museum, Brisbane.

BOOK REVIEW.

"Elementary Dietetics for the Student of Domestic Science and the Housewife." By George Zephirin Dupain, Sydney, Geo. B. Philip & Son, 128 pp. Price, 2/- (school edition), 3/- (library edition).

The author is an associate of the Australian Chemical Institute, and explains in an easy way some of the results of modern research into the value of different foods. In a diet which is well balanced, says the author, there will be found proportionate amounts of proteins, fats, carbohydrates, mineral salts, vitamins and water. He does not make the mistake of allowing himself to become obsessed by one factor, but looks at all constituents of food in their proper proportion. Directions are given for simple chemical tests that can be carried out in the home, and these are followed by the relative values of the different methods of cooking and the best means of treating different foods. The book contains a lot of miscellaneous information, especially in the chemical side not usually obtainable in so condensed a space in a popular book and only usually obtainable by searching through many volumes and pamphlets.

NOTES ON THE CRETACEOUS DEEP SEA DEPOSITS OF ENGLAND AND THE SHALLOW SEA DEPOSITS OF THE LIBYAN DESERT.

By G. K. Jackson (on active service)

To the average Queensland naturalist, geological deposits of the Cretaceous Age, the last age of the Mesozoic era, are a well-known and carefully studied feature of our State. The vast area of the artesian basin, known to geologists as the site of "The Great Cretaceous Sea of Queensland," has always been, and always will be a vast encyclopedia of knowledge. In it we may turn back the pages of the past, and see life replaced by inorganic deposits in the petrified sea bed of another age.

I chose the two areas under consideration not merely because I have had the opportunity of studying both, but rather in view of the fact that they are so vastly different. Both

are sedimentary formations, both were laid down in the bed of a Cretaceous sea, but the circumstances under which each one was built up, are so contradistinct, as to render them incomparable to the average eye witness.

The South Downs of England are composed of vast calcareous layers of chalk, containing secondary siliceous deposits of chalcedony. At one time, this area was completely covered by a deep sea, and its bed was similar in many respects to that of the adjacent Atlantic Ocean to-day.

Sea water contains countless billions of minute protozoa, known as foramanifera. These are one-celled creatures each protected by a tiny calcareous shell of numerous strange and beautiful shapes. The animal obtains its food by embracing small particles in its semi-liquid pseudopodia, after which the material is absorbed to nourish the tiny creature. As time goes by the small shells of these foramanifera are continually sinking down to the depths of the ocean to form deposits known to us as oozes. At great depths they are undisturbed by ocean currents, and at some future date a geological movement of the lithosphere may bring them above the surface of the water, to form such land as we find in the South of England to-day. At a later date, water containing silica in solution, and a percentage of organic matter percolates through the soft rocks, and deposits its burden in concentric layers around the sides of cavities in the chalk. Eventually these cavities became filled, and remain as nodules of flint, to supply the material from which our distant ancestors manufactured their simple implements of daily use. The birth of industry, and the first stairway in the ascent of man.

The scene changes from the lush green pastures and copses of England. The rose gardens and the little brooks fade behind the heat shimmers, and sink below the borders of the sea.

The bare, grey Libyan Desert, with its dusty treacherous plains, its ragged escarpments, and its white sand dunes, stretching to the silent crests of time worn residuals, the valleys in the seas of another day. Your footsteps break the silence with the tinkling of dead sea shells, and the wind moves the restless sand where once, long ago the sea waves lapped and sparkled beneath a tropic sun.

The vast areas in this part of Africa are composed of sheets of limestone in various stages of denudation. They were for the most part laid down on the bed of a shallow tropic sea, and the decomposition of the many exoskeletons of marine organisms such as coelenterata, echinoderms, molluscs, etc., have been converted throughout the ages into a hard calcareous rock heavily impregnated with the shells from which it originated. The old, smoothly contoured sea bed has been further weathered by the action of wind and rare torrential storms, and as is the case in most horizontally stratified desert areas, the elements have cut through the protecting upper layers of rock and have levelled off the surrounding country, leaving behind low table mountains, residuals or remnants capped and protected by a remaining fragment of the firmer layer on their crest.

On the talus slopes of these hills I found heaps of oyster shells and *Avicula pectens*, the ancestors of the common *pectens* or fan shells of our own beaches. The oysters occurred in such heaps as to remind one of native kitchen middens, as they lay white and bleached on the desert sands.

Coelenterata, or corals, mainly of the branching type were common in large patches, which had at one time either been reefs, or the central hub of some local sea current. Amongst the most outstanding of the many fossils, is the echinodermata or sea urchin, which is especially prolific about the weathered gorges and low level salt lakes in the vicinity of Jerabub. In this particular area local block faults have formed precipitous valleys into which gorges have been carved. Layer upon layer of overhanging limestone, residuals and ragged tall slopes, falling away into the blue, misleading "jewels" of salt saturated water, twinkling in mockery amidst the green papyrus and scattered palm trees.

Travelling west from Egypt, along the coast line of Libya, we find that the low undulating coastline gives place to small rugged cliffs and headlands, greatly distorted in the eyes of the observer owing to the lack of comparison with other objects. Here the land rises back from the coast in a series of steps, each one representing a layer or group of layers in the limestone. This horizontal stratification was used to advantage by the ancient Greeks and Romans who carved small man-holes through the upper layer and led these to large caves below, thus protecting themselves from the blinding dust and sand storms which are an almost constant feature of this unfortunate but interesting land.

